



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	MICROCONTROLLERS AND DIGITAL SIGNAL PROCESSING
Course Code	:	AEC022
Program	:	B.Tech
Semester	:	VI
Branch	:	Electrical and Electronics Engineering
Section	:	A & B
Course Faculty	:	Mrs.J.Sravana, Assistant Professor, ECE

COURSE OBJECTIVES:

I	Enrich the knowledge of evolution of processor.
II	Apply the concept of assembly language programs for different applications.
III	Analyze and apply the concepts of discrete signals using discrete fourier transform.
IV	Analyze and design IIR and FIR digital filters.

DEFINITIONS AND TERMINOLOGY QUESTION BANK

SNo	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I						
1	What is a processor	Processor or micro-processor is the 'brains' of a computer system. It is the processor that controls the working of all of the hardware and software.	Remember	CO1	CLO 1	AEC022.01
2	What is a combinational circuit	Combinational circuit is a circuit in which we combine the different gates in the circuit, for example encoder, decoder, multiplexer and demultiplexer.	Remember	CO1	CLO 1	AEC022.01
3	What is an sequential circuit	A sequential circuit is a logical circuit, where the output depends on the present value of the input signal as well as the sequence of past inputs. While a combinational circuit is a function of present input only	Understand	CO1	CLO 1	AEC022.01
4	Define the term microprocessor	An integrated circuit that contains all the functions of a central processing unit of a computer.	Understand	CO1	CLO 1	AEC022.01
5	Define the term microcontroller	A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip	Understand	CO1	CLO 1	AEC022.01
6	Explain the term von Neumann architecture	Von Neumann architecture is based on the stored-program computer concept, where instruction data and program data are stored in the same memory. This design is still used in most computers produced today	Understand	CO1	CLO 1	AEC022.01

7	Explain the term Harvard architecture	The Harvard architecture is a computer architecture with physically separate storage and signal pathways for instructions and data	Remember	CO1	CLO 1	AEC022.01
8	Define term CISC	A complex instruction set computer (<i>CISC</i> /'sisk/) is a computer in which single instructions can execute several low-level operations (such as a load from memory, an arithmetic operation, and a memory store) or are capable of multi-step operations or addressing modes within single instructions	Understand	CO1	CLO 1	AEC022.01
9	Define term RSIC	RISC (reduced instruction set computer) is a microprocessor that is designed to perform a smaller number of types of computer instructions so that it can operate at a higher speed (perform more millions of instructions per second, or MIPS)	Understand	CO1	CLO 1	AEC022.01
10	Define Register	A processor register (CPU register) is one of a small set of data holding places that are part of the computer processor. A register may hold an instruction, a storage address, or any kind of data (such as a bit sequence or individual characters). Some instructions specify <i>registers</i> as part of the instruction.	Understand	CO1	CLO 1	AEC022.01
11	Explain the memory organization	Memory Organization in Computer Architecture. A memory unit is the collection of storage units or devices together. The memory unit stores the binary information in the form of bits.	Understand	CO1	CLO 1	AEC022.01
12	Define input port	Input port may refer to: Input device, a generic term for any device that provides input to a system. Parallel port, a computer hardware interface. Serial port, a computer hardware interface. ... PS/2 connector, a common computer interface for mice and keyboards.	Remember	CO1	CLO 1	AEC022.01
13	Define counter	<i>counter</i> is a sequential circuit. A digital circuit which is used for a counting pulses is known counter. Counter is the widest application of flip-flops.	Remember	CO1	CLO 1	AEC022.01
14	Define timer	Timer is a clock that controls the sequence of an event while counting in fixed intervals of time. A Timer is used for producing precise time delay.	Remember	CO1	CLO 1	AEC022.01
15	Explain the term Serial and parallel data	Digital data transmission can occur in two basic modes: serial or parallel. Data within a computer system is transmitted via parallel mode on buses with the width of the parallel bus matched to the word size of the computer system. Data between computer systems is usually transmitted in bit serial mode	Remember	CO1	CLO 1	AEC022.01
16	Define interrupt	An interrupt is a signal from a device attached to a computer or from a program within the computer that requires the operating system to stop and figure out what to do next. ... The computer simply takes turns managing the programs that the user starts.	Remember	CO1	CLO 1	AEC022.01
17	Define output port	Input/output port. ... Alternatively referred to as I/O address, I/O port, and I/O port address, the input/output port is a memory address used by software to communicate with hardware on your computer. In your computer there are 65,535 memory ports that are numbered from 0000h to FFFFh.	Remember	CO1	CLO 1	AEC022.01

18	What is an Instruction format	The assembler processes an Instruction it converts the instruction from its mnemonics form to standard machine language format called the "Instruction format".	Remember	CO1	CLO 1	AEC022.01
19	What is an ISR	ISR (Interrupt Service Routine) is a short program to instruct the microprocessor on how to handle the interrupt.	Remember	CO1	CLO 1	AEC022.01
20	Define assembler	Assembler converts instructions written in low-level symbolic code into machine code.	Remember	CO1	CLO 1	AEC022.01
21	What is versatility	The microprocessors are versatile as the same chip can be used in a number of applications by configuring the software program.	Remember	CO1	CLO 1	AEC022.01
22	What is a pre-fetch unit	The pre-fetch Unit decides when to order data and instructions from the Instruction Cache or the computer's main memory based on commands or the task at hand.	Remember	CO1	CLO 1	AEC022.01
23	What is a decode unit	The Decode Unit decodes or translates complex machine language instructions into a simple format understood by the Arithmetic Logic Unit (ALU) and the Registers. This makes processing more efficient.	Remember	CO1	CLO 1	AEC022.01
24	What is a stack	Stack is an area of memory identified by the programmer for temporary storage of information.	Remember	CO1	CLO 1	AEC022.01
25	What is an Instruction format	The assembler processes an Instruction it converts the instruction from its mnemonics form to standard machine language format called the "Instruction format".	Remember	CO1	CLO 1	AEC022.01
26	What is speed of a microprocessor	Time required executing a basic instruction	Remember	CO1	CLO 1	AEC022.01
27	What is an ISR	ISR (Interrupt Service Routine) is a short program to instruct the microprocessor on how to handle the interrupt.	Remember	CO1	CLO 2	AEC022.02
28	What is versatility	The microprocessors are versatile as the same chip can be used in a number of applications by configuring the software program.	Remember	CO1	CLO 2	AEC022.02
29	What is a segment register	The segment registers store segment base address of the memory segment	Remember	CO1	CLO 2	AEC022.02
30	Define bit.	Bit is the smallest unit of memory storage.	Remember	CO1	CLO 2	AEC022.02
31	What is machine instruction?	Machine instruction is binary code for processing by hardware.	Understand	CO1	CLO 2	AEC022.02
32	What is assembler directives?	Assembler directives direct the assembler to do something. As the name says, it directs the assembler to do a task.	Remember	CO1	CLO 2	AEC022.02
33	What is define byte (DB) directive	Define Byte [DB] directive defines the byte type variable.	Remember	CO1	CLO 2	AEC022.02
34	What is define word (DW) directive	Define Word [DW] directive defines items that are one word (two bytes) in length.	Remember	CO1	CLO 3	AEC022.03

35	What is define quad word (DQ) directive	Define Quad word [DQ] directive is used to tell the assembler to declare variable 4 words in length or to reserve 4 words of storage in memory.	Remember	CO1	CLO 3	AEC022.03
36	What is define ten bytes (DT) directive	Define Ten bytes [DT] is used to define the data items that are 10 bytes long	Remember	CO1	CLO 4	AEC022.04
37	What Is Data Movement	Data movement instructions move data from one location to another. The source and destination locations are determined by the addressing	Remember	CO1	CLO 5	AEC022.05
38	What is Assembly Numbers	Numerical data is generally represented in binary system. Arithmetic instructions operate on binary data. When numbers are displayed on screen or entered from keyboard, they are in ASCII form.	Remember	CO1	CLO 3	AEC022.03
39	What is Assembly Strings?	We have already used variable length strings in our previous examples. The variable length strings can have as many characters as required.	Remember	CO1	CLO 5	AEC022.05
40	What Is Meant By Cross-compiler?	A program runs on one machine and executes on another is called as cross- compiler Programs which compile on One Machine and Execute on Another machine is called cross compiler	Remember	CO1	CLO 3	AEC022.03
41	What is an instruction pointer?	Instruction Pointer (IP) stores the offset address of the next instruction to be done.	Understand	CO1	CLO 4	AEC022.04
UNIT-II						
1	What is assembly language	An assembly language is a low-level programming language for microprocessors and other programmable devices. ... An assembly language implements a symbolic representation of the machine code needed to program a given CPU architecture. Assembly language is also known as assembly code	Remember	CO2	CLO 6	AEC022.06
2	Define instruction	An instruction is an order given to a computer processor by a computer program. ... In assembler language, a macro instruction is one that, during processing by the assembler program, expands to become multiple instructions (based on a previously coded macro definition	Remember	CO2	CLO 6	AEC022.06
3	Define instruction set	An instruction set is a group of commands for a CPU in machine language. ... In CISC (Complex Instruction Set Computer) processors there is also a microcode layer, which involves programmable instructions stored in fast memory that may be updated.	Remember	CO2	CLO 6	AEC022.06
4	Define data lines	With computer microchips, a data line is an electrical line or circuit that carries data and determines whether a bit represents a 0 or a 1	Remember	CO2	CLO 6	AEC022.06
5	Define address lines	An address is a collection of information, presented in a mostly fixed format, used to give the When addresses are written inline, line breaks are replaced by commas. Conventions on the placing major road or town.	Remember	CO2	CLO 6	AEC022.06

6	What is a addressing mode	Addressing modes are an aspect of the instruction set architecture in most central processing unit (CPU) designs. The various addressing modes that are defined in a given instruction set architecture define how machine language instructions in that architecture identify the operand(s) of each instruction.	Remember	CO2	CLO 6	AEC022.06
7	What is immediate addressing mode	Addressing mode is a way to address an operand. Operand means the data we are operating upon (in most cases source data). It can be a direct address of memory, it can be register names, it can be any numerical data etc. I will explain this with a simple data move instruction of 8051. MOV A,#6AH.	Remember	CO2	CLO 6	AEC022.06
8	What is register addressing mode	Register addressing mode involves the use of registers to hold the data to be manipulated	Remember	CO2	CLO 7	AEC022.07
9	What is direct addressing mode	Direct Addressing Mode. Direct addressing mode means that the value for a given instruction in assembly programming is pointed to by a given value. This means the value is variable, based on what is stored in memory at a given address.	Remember	CO2	CLO 7	AEC022.07
10	What is register indirect addressing mode	Register Indirect Addressing Mode. Register indirect addressing means that the location of an operand is held in a register. It is also called indexed addressing or base addressing. Register indirect addressing mode requires three read operations to access an operand	Remember	CO2	CLO 6	AEC022.06
11	What is indexed addressing mode	The address of the operand is obtained by adding to the contents of the general register (called index register) a constant value. The number of the index register and the constant value are included in the instruction code. Index Mode is used to access an array whose elements are in successive memory locations.	Remember	CO2	CLO 6	AEC022.06
12	Define timer port	Timers are devices that do what their name implies; they can be used to count events or signals external to the system, or the can be used to time activities. A timer is a hardware device that must be initialized or programmed just as other I/O devices.	Remember	CO2	CLO 6	AEC022.06
13	Define counter port	Counter are devices that do what their name implies; they can be used to count events or signals external to the system, or the can be used to time activities. A counter is a hardware device that must be initialized or programmed just as other I/O devices.	Remember	CO2	CLO 6	AEC022.06
14	Define serial communication	Serial communication is a communication technique used in telecommunications wherein data transfer occurs by transmitting data one bit at a time in a sequential order over a computer bus or a communication channel. It is the simplest form of communication between a sender and a receiver	Remember	CO2	CLO 6	AEC022.06
15	Define parallel communication?	In data transmission, parallel communication is a method of conveying multiple binary digits (bits) simultaneously	Remember	CO2	CLO 6	AEC022.06

16	DJNZ Instructions of Intel 8051	DJNZ Rn, rel - Decrement the content of the register Rn and jump if not zero. DJNZ direct, rel - Decrement the content of direct 8-bit address and jump if not zero	Understand	CO2	CLO 6	AEC022.06
17	Describe alternate functions for the port pins of port3?	RD WR T1 T0 INT1 INTO TXDRXD are assigned to eight pins port 3.	Remember	CO2	CLO 6	AEC022.06
18	Specify the single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits.	Single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits is CLR B.7.	Remember	CO2	CLO 6	AEC022.06
19	What is the function of the pins PSEN and EA of 8051?	PSEN: PSEN stands for program store enable. In 8051 based system in which an external ROM holds the program code, this pin is connected to the OE pin of the ROM	Remember	CO2	CLO 7	AEC022.07
20	What is the significance of EA line of 8051 microcontroller?	This is used to access external memory RAM and Rom in Microcontroller.	Remember	CO2	CLO 6	AEC022.06
21	What is the size of the on- chip program memory and on-chip RAM in a typical microcontroller?	In 8051 microcontroller for example, internal program memory is 4KB and internal RAM is 128 bytes	Remember	CO2	CLO 6	AEC022.06
22	Mention the advantages of using a microcontroller in place of a microprocessor.	While using microcontroller the on chip resources RAM, ROM, IO and timer can be utilized. So this results in reduction of hardware.	Remember	CO2	CLO 6	AEC022.06
23	Which addressing modes are supported by 8051 to copy the data?	Immediate addressing modes are supported by 8051 to copy the data.	Remember	CO2	CLO 6	AEC022.06
24	Mention the function of RST pin in a microcontroller.	RST(pin 9) : Reset It is an input pin and is active high normally low. This should be high for at least 2 machine cycles. It is used to reset values of some 8051 registers	Understand	CO2	CLO 6	AEC022.06
25	Which signal is used to enable external program memory	PSEN (pin 29) : program store enable. This is an output pin and is connected to the OE pin of the ROM	Understand	CO2	CLO 6	AEC022.06
26	Define ALE signal in the context of multiplexing	ALE is defined as address latch enable. It is an output pin and is active high. 8051 port 0 provides both address and data. The ALE pin is used for de-	Remember	CO2	CLO 6	AEC022.06

	address and data information in a bus	multiplexing the address and data by connecting to the G pin of the 74LS373 latch				
27	What ports are used to address external memory in 8051	Port 0 provides AD0-AD7 Port 2 provides A8-A1	Remember	CO2	CLO 8	AEC022.08
28.	How multiplication is done in a micro controller	MUL AB Multiply A by B A low byte (A*B) Bhigh byte (A* B)	Remember	CO2	CLO 8	AEC022.08
29	What is the instruction two swap the two nibbles in 8051	SWAP A. It exchanges the nibbles within accumulator.	Remember	CO2	CLO 9	AEC022.09
30	Mention the special functions registers available in 8051.	a.B Register b.Program Status Word. c.Stack Pointer. d.Data Pointer. e.Port0 f.Port1 g.Port2 h.Port3 i. Interrupt priority control register Interrupt enable control register	Understand	CO2	CLO 9	AEC022.09
31	What is the code to find the 2's complement using 8051.	MOV A,R0 CPL A INC A	Understand	CO2	CLO 9	AEC022.09
32.	What is the code to add 2 8-bit numbers using 8051.	MOV A, #30H ADD A, #50H	Remember	CO2	CLO 9	AEC022.09
33	What is the code to subtract the contents of R1 of Bank0 from the contents of R0 of Bank2 using 8051.	MOV PSW,#10 MOV A, R0 MOV PSW,#00 SUBB A, R1	Remember	CO2	CLO 9	AEC022.09
34	What is program counter? How is it useful in program execution	The program counter keeps track of program execution. To execute a program the starting address of the program is loaded in program counter. The PC sends out an address to fetch a byte of instruction from memory and increments its content automatically.	Remember	CO2	CLO 9	AEC022.09
35	Define stack.	Stack is a sequence of RAM memory locations defined by the programmer	Remember	CO2	CLO 10	AEC022.10
36	What is the distribution of 128 bytes on chip RAM of 8051	Register Banks 32 bytes Bit addressable Memory 16 bytes General purpose RAM 80 bytes	Remember	CO2	CLO 10	AEC022.10

37.	Mention any two examples of immediate addressing mode in 8051.	MOV A, #23 ADD r2, #44	Understand	CO2	CLO 10	AEC022.10
38	What are the events that generate interrupts in 8051	The 8051 so that any of the following events will cause an interrupt: <ul style="list-style-type: none"> • Timer 0 Overflow. • Timer 1 Overflow. • Reception/Transmission of Serial Character. External Event 0. External Event 1.	Remember	CO2	CLO 10	AEC022.10
39.	What is need of auxiliary carry Flag	The Auxiliary Carry (AC) bit is set if there is a carry-out of bit 3. In other words, if the unsigned summed value of the low nibble of the Accumulator, operand and (in the case of ADDC) the Carry flag exceeds 15 the Auxiliary Carry flag is set. Otherwise, the Auxiliary Carry flag is cleared	Remember	CO2	CLO 10	AEC022.10
40	How time delay is generated in a microcontroller	Counters/timers which can be used either as timer to generate a time delay or as counter to count events happening outside the microcontroller	Remember	CO2	CLO 10	AEC022.10
41	Differentiate between Mode 0 and Mode 1 for Timers.	Mode 0: This is a 13-bit mode that means the timer operation completes with "8192" pulses. Mode 1: This is a 16-bit mode, which means the timer operation completes with maximum clock pulses that "65535"	Remember	CO2	CLO 10	AEC022.10
UNIT-III						
1	Define internal memory	Internal memory, Typically refers to main memory (RAM), but may also refer to ROM and flash memory. In either case, internal memory generally refers to chips rather than disks or tapes. Some vendors call their disk drives "memory products," which only adds to the confusion.	Remember	CO3	CLO 11	AEC022.11
2	Define external memory	External memory refers to external hard drives, discs and USB thumb drives. These are all media kept externally to your PC case. External media is also known as auxiliary memory or secondary storage. ... This means that many people turn to alternative long-term storage devices that complement the internal memory.	Remember	CO3	CLO 11	AEC022.11
3	Define Decoding	Decoding is the process of converting code into plain text or any format that is useful for subsequent processes. Decoding is the reverse of encoding. It converts encoded data communication transmissions and files to their original states.	Remember	CO3	CLO 11	AEC022.11
4	Explain memory space decoding	Memory Address Decoding. The processor can usually address a memory space that is much larger than the memory space covered by an individual memory chip.	Remember	CO3	CLO 11	AEC022.11
5	Define clock	In electronics and especially synchronous digital circuits, a clock signal is a particular type of signal that oscillates between	Remember	CO3	CLO 11	AEC022.11

		a high and a low state and is used like a metronome to coordinate actions of digital circuits. A clock signal is produced by a clock generator.				
6	Explain clock circuits	In a computer, clock speed refers to the number of pulses per second generated by an oscillator that sets the tempo for the processor. ... The clock speed is determined by a quartz-crystal circuit, similar to those used in radio communications equipment.	Understand	CO3	CLO 11	AEC022.11
7	Define logical address	In computing, a logical address is the address at which an item (memory cell, storage element, network host) appears to reside from the perspective of an executing application program. A logical address may be different from the physical address due to the operation of an address translator or mapping function.	Remember	CO3	CLO 11	AEC022.11
8	Define physical address	A physical address is a binary number in the form of logical high and low states on an address bus that corresponds to a particular cell of primary storage (also called main memory), or to a particular register in a memory-mapped I/O (input/output) device.	Remember	CO3	CLO 11	AEC022.11
9	Explain memory mapping	Memory mapping is the translation between the logical address space and the physical memory. ... When the logical address space is larger than the physical address space, mapping is used to insure that each logical address generated corresponds to an existing physical memory cell.	Remember	CO3	CLO 11	AEC022.11
10	Explain memory mapping	Memory-mapped I/O. ... So when an address is accessed by the CPU, it may refer to a portion of physical RAM, or it can instead refer to memory of the I/O device. Thus, the CPU instructions used to access the memory can also be used for accessing devices	Remember	CO3	CLO 12	AEC022.12
11	Define key identification	Identification keys are also used in many other scientific and technical fields to identify various kinds of entities, such as diseases, soil types, minerals, or archaeological and anthropological artifacts. Traditionally identification keys have most commonly taken the form of single-access keys.	Remember	CO3	CLO 12	AEC022.12
12	Explain 4*4 keyboard matrix	It is so as to detect which key is pressed from the matrix keypad, the row lines are to be made low one by one and read the columns. Here we are going to see a 4x3 matrix keypad. It is 12 keys keypad consists of four rows and three columns.	Remember	CO3	CLO 12	AEC022.12
13	Define ADC	This device can take an analog signal, such as an electrical current, and digitize it into a binary format that the computer can understand. A common use for an ADC is to convert analog video to a digital format.	Remember	CO3	CLO 12	AEC022.12
14	Define DAC	A digital-to-analog converter (DAC) is a device, usually consisting of a single chip, for converting binary or digital code into an analog signal. A DAC device converts an abstract finite precise number, typically a fixed-point binary number, into a definite physical variable	Remember	CO3	CLO 12	AEC022.12

		such as voltage or pressure.				
15	Define digit drive pattern	Digit drive pattern of a seven segment LED display is simply the different logic combinations of its terminals 'a' to 'h' in order to display different digits and characters	Understand	CO3	CLO 12	AEC022.12
16	Define look up table	In computer science, a lookup table is an array that replaces runtime computation with a simpler array indexing operation. The savings in terms of processing time can be significant, since retrieving a value from memory is often faster than undergoing an "expensive" computation or input/output operation	Remember	CO3	CLO 12	AEC022.12
17	Define common cathode of led?	Common cathode means that the cathodes of all of the LEDs are common and connected to a single pin. The anode for each LED has its own pin. So driving one of these means running a current from the particular anode (positive) pin for the desired segment to the common cathode pin.	Remember	CO3	CLO 12	AEC022.12
18	Define common anode of led	Common anode means that the anode (positive) side of all of the LEDs are electrically connected at one pin, and each LED cathode has its own pin. ... So driving one of these means running a current from the particular anode (positive) pin for the desired segment to the common cathode pin	Remember	CO3	CLO 13	AEC022.13
19	How baud rate is setup in 8051?	The Baud Rate is determined based on the oscillator's frequency when in mode 0 and 2. In modes 1 and 3, the baud rate is determined by how frequently timer 1 overflows. The more frequently timer 1 overflows, the higher the baud rate	Remember	CO3	CLO 13	AEC022.13
20	How Timer Mode 2 operates in 8051	Timer mode "2" is an 8-bit auto-reload mode. When a timer is in mode 2, THx holds the "reload value" and TLx is the timer itself. Thus, TLx starts counting up. When TLx reaches 255 and is subsequently incremented, instead of resetting to 0 (as in the case of modes 0 and 1), it will be reset to the value stored in THx	Remember	CO3	CLO 13	AEC022.13
21	What is the role of SCON (serial control register) for serial communication?	The Serial Control is used to configure the behavior of the 8051's on-board serial port. This SFR controls the baud rate of the serial port, whether the serial port is activated to receive data, and also contains flags that are set when a byte is successfully sent or received.	Remember	CO3	CLO 13	AEC022.13
22	What is the purpose of TCON (Timer Control register) of 8051	The Timer Control SFR is used to configure and modify the way in which the 8051's two timers operate. This SFR controls whether each of the two timers is running or stopped and contains a flag to indicate that each timer has overflowed. Additionally, some non-timer related bits are located in the TCON SFR. These bits are used to configure the way in which the external interrupts are activated and	Remember	CO3	CLO 13	AEC022.13

		also contain the external interrupt flags which are set when an external interrupt has occurred.				
23	How SCON (serial control register) can be used for serial communication	The Serial Control SFR is used to configure the behaviour of the 8051's on-board serial port. This SFR controls the baud rate of the serial port, whether the serial port is activated to receive data, and also contains flags that are set when a byte is successfully sent or received.	Understand	CO3	CLO 13	AEC022.13
24	Mention the role of SBUF in the context of serial communication.	The Serial Buffer SFR is used to send and receive data via the on-board serial port. Any value written to SBUF will be sent out the serial port's TXD pin. Likewise, any value which the 8051 receives via the serial port's RXD pin will be delivered to the user program via SBUF. In other words, SBUF serves as the output port when written to and as an input port when read from.	Understand	CO3	CLO 13	AEC022.13
25	How in RS232, logic 0 is represented	In RS232, logic 1 is represented by +3 to +25 volts. This is useful in long distance communication.	Understand	CO3	CLO 13	AEC022.13
26	What is RS-232C Standard	The RS232C is a serial bus consisting of a maximum of 25 signals, which are standardized by EIA (Electronic Industry Association). The first 9 signals are sufficient for most of the serial data transmission	Remember	CO3	CLO 13	AEC022.13
27.	How split timer mode operates in 8051	Timer mode "3" is a split-timer mode. When Timer 0 is placed in mode 3, it essentially becomes two separate 8-bit timers. That is to say, Timer 0 is TL0 and Timer 1 is TH0. Both timers count from 0 to 255 and overflow back to 0. All the bits that are related to Timer 1 will now be tied to TH0.	Remember	CO3	CLO 14	AEC022.14
28.	What is the function of driver circuit for stepper motor	It acts as Voltage Amplifier.	Remember	CO3	CLO 14	AEC022.14
29.	What is relation between resolution and no. of bits in ADC	The resolution increases with no. of Bits in ADC. For ex. 8 bit ADC Provides best resolution compared to 4 bits.	Remember	CO3	CLO 14	AEC022.14
30.	What is the relation between clock cycle and machine cycle in a microcontroller	The machine cycle consists of integral multiple no. of clock cycles. In 8051 each machine cycle consists of 12 clock pulses.	Remember	CO3	CLO 14	AEC022.14
31.	Differentiate between internal and external interrupts.	Internal interrupts are activated by mechanisms inside the chip. External interrupts are activated when signals are received at the input pins of the chip.	Remember	CO3	CLO 14	AEC022.14
32.	How timer interrupt is generated	For ex. in mode 1, timer 1 register overflows when the register count reaches FFFF and it rolls back to 0000 and after generating timer interrupt.	Remember	CO3	CLO 14	AEC022.14

33.	What type of communication is used in long distance	Serial type of communication is used in long distance. This is to reduce the cost of physical mediums.	Remember	CO3	CLO 15	AEC022.15
34.	What is the interrupt structure of 8051	8051 has 5 interrupt signals, i.e. INT0, TFO, INT1, TF1, RI/TI. Each interrupt can be enabled or disabled by setting bits of the IE register and the whole interrupt system can be disabled by clearing the EA bit of the same register.	Remember	CO3	CLO 15	AEC022.15
35.	What is the necessity of external memory interfacing in a microcontroller	The designer of an 8051 Microcontroller based system is not limited to the internal RAM and ROM present in the 8051 Microcontroller. There is a provision of connecting both external RAM and ROM i.e. Data Memory and Program. The reason for interfacing external Program Memory or ROM is that complex programs written in high – level languages often tend to be larger and occupy more memory.	Remember	CO3	CLO 15	AEC022.15
36.	How much maximum external memory can be connected in a microcontroller with 16 address lines	A maximum of 64 KB external memory can be connected in a microcontroller with 16 address lines.	Remember	CO3	CLO 15	AEC022.15
37.	What is the need of data converters in microcontrollers	Digital processing and storage of physical quantities (sound, temperature, pressure etc) exploits the advantages of digital electronics. Better and cheaper technology compared to the analog. More reliable in terms of storage, transfer and processing	Remember	CO3	CLO 15	AEC022.15
38.	Mention the function of RST pin in a microcontroller.	RST(pin 9) : Reset It is an input pin and is active high normally low. This should be high for at least 2 machine cycles. It is used to reset values of some 8051 registers	Remember	CO3	CLO 15	AEC022.15
39.	Which signal is used to enable external program memory?	PSEN (pin 29) : program store enable. This is an output pin and is connected to the OE pin of the ROM	Understand	CO3	CLO 15	AEC022.15
40.	Define ALE signal in the context of multiplexing address and data information in a bus	ALE is defined as address latch enable. It is an output pin and is active high. 8051 port 0 provides both address and data. The ALE pin is used for de-multiplexing the address and data by connecting to the G pin of the 74LS373 latch.	Remember	CO3	CLO 15	AEC022.15

UNIT-IV

1	Define discrete time signal.	A discrete time signal $x(n)$ is a function of an independent variable that is an integer. a discrete time signal is not defined at instant between two successive samples.	Remember	CO4	CLO 16	AEC022.16
2	Define discrete time system.	A discrete or an algorithm that performs some prescribed operation on a discrete time signal is called discrete time system.	Remember	CO4	CLO 16	AEC022.16

3	Define periodic signal.	A signal $x(n)$ is periodic in period N , if $x(n+N) = x(n)$ for all n . If a signal does not satisfy this equation, the signal is called aperiodic signal.	Remember	CO4	CLO 16	AEC022.16
4	Define symmetric signal.	A real value signal $x(n)$ is called symmetric (even) if $x(-n) = x(n)$.	Remember	CO4	CLO 16	AEC022.16
5	What is a anti-symmetric signal	A real value signal $x(n)$ is called antisymmetric (odd) if $x(-n) = -x(n)$.	Remember	CO4	CLO 16	AEC022.16
6	Define static system.	A discrete time system is called static or memory less if its output at any instant depends almost on the input sample at the same time but not on past and future samples of the input. e.g. $y(n) = a x(n)$	Remember	CO4	CLO 16	AEC022.16
7	Define dynamic system.	A discrete time system is called dynamic or with memory if its output at any instant depends on the input sample at the same time but not on past and future samples of the input. e.g. $y(n) = x(n) + 3x(n-1)$	Remember	CO4	CLO 17	AEC022.17
8	Define time invariant system.	A system is called time invariant if its output, input characteristics do not change with time. e.g. $y(n) = x(n) + x(n-1)$	Remember	CO4	CLO 17	AEC022.17
9	Define time variant and system.	A system is called time variant if its input, output characteristics changes with time. e.g. $y(n) = x(-n)$.	Remember	CO4	CLO 17	AEC022.17
10	What is a linear system	Linear system is one which satisfies superposition principle. Superposition principle: The response of a system to a weighted sum of signals be equal to the corresponding weighted sum of responses of system to each of individual input signal. i.e., $T[a_1x_1(n) + a_2x_2(n)] = a_1T[x_1(n)] + a_2T[x_2(n)]$ e.g. $y(n) = nx(n)$	Remember	CO4	CLO 17	AEC022.17
11	Define non-linear system	A system which does not satisfy superposition principle is known as non-linear system e.g. $y(n) = x^2(n)$	Remember	CO4	CLO 18	AEC022.18
12	Define causal system.	The system is said to be causal if the output of the system at any time 'n' depends only on present and past inputs but does not depend on the future inputs. e.g.:- $y(n) = x(n) - x(n-1)$	Remember	CO4	CLO 18	AEC022.18
13	Define non-causal system.	The system is said to be non-causal if the output of the system at any time 'n' also depends future inputs. e.g.:- $y(n) = x(n) - x(n-1) + 2x(n+2)$	Remember	CO4	CLO 18	AEC022.18

14	What is a stable system	A system is said to be stable if we get bounded output for bounded input.	Remember	CO4	CLO 18	AEC022.18
15	Define impulse response.	The response of system for a unit impulse input is called impulse response.	Understand	CO4	CLO 18	AEC022.18
16	Define IIR system.	If the impulse of the system is infinite duration then the system is called infinite impulse response(IIR) system. e.g.:- $h(n)=0.5^n u(n)$	Remember	CO4	CLO 18	AEC022.18
17	Define FIR system.	If the impulse of the system is finite duration then the system is called finite impulse response(FIR) system. e.g.:- $h(n)=\{1,2,3,4\}$	Remember	CO4	CLO 18	AEC022.18
18	What is cascading	If the output of one stage is given as input to its next stage then it is called cascading	Remember	CO4	CLO 19	AEC022.19
19	What is stability test	If a system is BIBO stable, then the output will be bounded for every input to the system that is bounded. A signal is bounded if there is a finite value such that the signal magnitude never exceeds , that is for discrete-time signals, or, for continuous-time signals.				
20	Define Region of Convergence.	The region of convergence (ROC) of $X(Z)$ the set of all values of Z for which $X(Z)$ attain final value.	Remember	CO4	CLO 19	AEC022.19
21	What do you mean by fundamental period of a signal	The smallest value of N that satisfies the condition $x(n+N) = x(n)$ for all values of n for discrete time signal is called the fundamental period of the signal $x(n)$.	Remember	CO4	CLO 19	AEC022.19
22	What is an energy signal	An energy signal is one whose total energy $E = \text{finite value}$ and whose average power $P = 0$	Remember	CO4	CLO 19	AEC022.19
23	What are digital signals	The signals that are discrete in time and quantized in amplitude are called digital signals.	Remember	CO4	CLO 19	AEC022.19
24	Define recursive system	Present output of system depends on present and past input s and also past outputs then the system said to be recursive system.	Understand	CO4	CLO 19	AEC022.19
25	Define static system.	A discrete time system is called static or memory less if its output at any instant depends almost on the input sample at the same time but not on past and future samples of the input.	Understand	CO4	CLO 19	AEC022.19
26	Define dynamic system.	A discrete time system is called dynamic or with memory if its output at any instant depends on the input sample at the same time but not on past and future samples of the input	Remember	CO4	CLO 19	AEC022.19
27	Define non recursive system.	If the present output of system depends on present and past inputs only, then the system said to be non - recursive	Remember	CO4	CLO 20	AEC022.20

28	Define Sectional Convolution.	If the data sequence $x(n)$ is of long duration it is very difficult to obtain the output sequence $y(n)$ due to limited memory of a digital computer. Therefore, the data sequence is divided up into smaller sections. These sections are processed separately one at a time and combined later to get the output.	Remember	CO4	CLO 19	AEC022.19
29.	Why convolution is required	Convolution is required to determine the response of an LTI system for a given input and impulse response.	Remember	CO4	CLO 19	AEC022.19
30.	What are the methods of evaluating convolution	The important methods to evaluate convolution are Overlap-add and overlap save methods.	Remember	CO4	CLO 19	AEC022.19
31.	What is natural response	Natural response is system's response to initial conditions with all external forces set to zero.	Remember	CO4	CLO 19	AEC022.19
32	What is cascading	If the output of one stage is given as input to its next stage then it is called cascading	Remember	CO4	CLO 19	AEC022.19
33	Define multi channel signal	Signals are generated by multiple sources or multiple sensors. These signals are represented by vector form. Vector of signals as a multichannel signals	Remember	CO4	CLO 20	AEC022.20
34	Define multi dimensional signal.	A signal is a function of more than two independent variables such type of signals is referred to as multi dimensional signal. A Signal is a function.	Remember	CO4	CLO 20	AEC022.20
35	What is signal modeling?	The representation of a signal by the mathematical expression is known as signal modeling.	Remember	CO4	CLO 20	AEC022.20
36	What is a odd signal?	A real value signal $x(n)$ is called anti-symmetric (odd) if $x(-n) = -x(n)$.	Remember	CO4	CLO 20	AEC022.20
37	What is DSP?	Digital signal processing (DSP) refers to performing operations on discrete and digital signals. i.e Processing of discrete signals by means of digital systems.	Remember	CO4	CLO 20	AEC022.20
38	Define Discrete time impulse response.	A linear time-invariant discrete-time system can be described by the discrete-time impulse response, which is defined as the response of the system to the impulse sequence.	Remember	CO4	CLO 20	AEC022.20
39	Define anti-causal signal.	A discrete time signal $x(n)$ is said to be anti-causal if $x(n)=0$ for $n>0$.	Remember	CO4	CLO 20	AEC022.20

40	Define Sectional Convolution.	If the data sequence $x(n)$ is of long duration it is very difficult to obtain the output sequence $y(n)$ due to limited memory of a digital computer. Therefore, the data sequence is divided up into smaller sections. These sections are processed separately one at a time and combined later to get the output	Remember	CO4	CLO 20	AEC022.20
41	What is convolution?	Convolution is a mathematical way of combining two signals to form a third signal. It is the most important technique in digital signal processing, using the strategy of impulse decomposition.	Remember	CO4	CLO 20	AEC022.20
UNIT- V						
1	What is a FIR system	FIR filters are one of two primary types of digital filters used in Digital Signal Processing. "FIR" means "Finite Impulse Response."	Remember	CO5	CLO 21	AEC022.21
2	What is linear phase	Linear phase is a property of a filter, where the phase response of the filter is a linear function of frequency. The result is that all frequency components of the input signal are shifted in time (usually delayed) by the same constant amount (the slope of the linear function),	Remember	CO5	CLO 21	AEC022.21
3	What is group delay	A more commonly encountered representation of filter phase response is called the group delay, i.e all frequency components of the input signal are shifted in time (usually delayed) by the same constant amount	Remember	CO5	CLO 21	AEC022.21
4	What is phase delay	The phase delay gives the time delay in seconds experienced by each component of the input signal. the phase delay expresses the phase response as a time delay in seconds.	Remember	CO5	CLO 21	AEC022.21
5	Phase unwrapping means	Phase unwrapping ensures that all appropriate multiples of 2π , have been included in phase response. We defined phase response simply as the complex angle of the frequency response , and this is not sufficient for obtaining a phase response which can be converted to true time delay.	Remember	CO5	CLO 21	AEC022.21
6	Define limit cycle	Nonlinearities may cause an IIR filter, which is stable under infinite precision, to exhibit an unstable behavior under finite precision arithmetic for specific input signals. This type of instability usually results in an oscillatory periodic output called a limit cycle	Remember	CO5	CLO 21	AEC022.21
7	What is Gibbs phenomenon?	Abrupt truncation of infinite series is equivalent to multiplying infinite series with rectangular sequence .This type of truncation may result in poor convergence of the series. i.e at the point of discontinuity some oscillation may be observed in resultant output signal .This oscillation or ringing is generated because of side lobes in the frequency response. This oscillatory behavior is called "Gibbs Phenomenon".	Remember	CO5	CLO 21	AEC022.21

8	What is Windowing Technique	Windowing is the quickest method for designing an FIR filter. A windowing function simply truncates the ideal impulse response to obtain a causal FIR approximation that is non-causal and infinitely long. Smoother window functions provide higher out-of band rejection in the filter response. However this smoothness comes at the cost of wider stop band transitions	Remember	CO5	CLO 21	AEC022.21
9	What is a equi ripple filter	An equi-ripple filter is simply a filter with ripples of equal height. The magnitude response of actual digital filters may exhibit ripples. For example, the magnitude response of a finite impulse response low pass filter may have ripples close to its cutoff frequency, because the typical filter construction will use continuous functions (e.g., with the Fourier transform) to approximate a discontinuous ideal magnitude response. These ripples are the manifestation of the Gibbs phenomenon. The fact that equi ripple filters have ripples of equal height should not mean much. It is more important that the design of equiripple filters is such that the height of these ripples can be controlled. This itself is not unique of equi ripple filters.	Remember	CO5	CLO 22	AEC022.22
10	What is a window	Windows are sometimes used in the design of digital filters, in particular to convert an "ideal" impulse response of infinite duration, such as a sinc function, to a finite impulse response (FIR) filter design. That is called the window method.	Remember	CO5	CLO 22	AEC022.22
11	What is Anti-symmetric FIR filter	FIR filter with unit impulse response or unit sample response as $h(n) = -h(M-1-n), \text{ for } n=0,1,2,\dots,M-1$	Remember	CO5	CLO 22	AEC022.22
12	What is FIR tap	A FIR "tap" is simply a coefficient/delay pair. The number of FIR taps, (often designated as "N") is an indication of 1) the amount of memory required to implement the filter, 2) the number of calculations required, and 3) the amount of "filtering" the filter can do; in effect, more taps means more stopband attenuation, less ripple, narrower filters, etc.	Remember	CO5	CLO 22	AEC022.22
13	Define Symmetric FIR filter	FIR filter with unit impulse response or unit sample response as $h(n) = h(M-1-n), \text{ for } n=0,1,2,\dots,M-1$	Remember	CO5	CLO 23	AEC022.23
14	What is transition band	The band of frequencies between pass band and stop band edges. The narrower the transition band, the more taps are required to implement the filter. (A "small" transition band results in a "sharp" filter.)	Remember	CO5	CLO 23	AEC022.23
15	What is Hilbert transform	The transform technique in which phase angle of all components of the signal is shifted by $\pm 90^\circ$ (degrees). The Hilbert transformer is very useful when out of phase component (or imaginary part) need to be generated from available real component of the signal. They are typically required in quadrature signal	Remember	CO5	CLO 23	AEC022.23

		processing.				
16	What is LMS algorithm	Least mean squares (LMS) algorithms are a class of adaptive filters used to mimic (imitate) a desired filter by finding the filter coefficients that relate to producing the least mean square of the error signal (difference between the desired and the actual signal). It is a stochastic gradient descent method in that the filter is only adapted based on the error at the current time.	Understand	CO5	CLO 23	AEC022.23
17	Define sampling	The process of converting continuous time analog signal into discrete samples is called sampling .	Remember	CO5	CLO 23	AEC022.23
18	State the structure of IIR filter	IIR filters are of recursive type whereby the present o/p sample depends on present i/p, past i/p samples and o/p samples. The design of IIR filter is realizable and stable. The impulse response $h(n)$ for a realizable filter is $h(n)=0$ for $n \leq 0$	Remember	CO5	CLO 23	AEC022.23
19	What are the IIR Filter types	By changing the Type (Low Pass/High Pass etc) of the filter, you can select the pattern of frequencies to pass or remove: Low-Pass - allows low frequencies to pass but excludes high frequencies. High-Pass - allows high frequencies to pass but excludes low frequencies. Band-Pass - allows only a selected band of frequencies to pass. Band-Stop - removes a selected band of frequencies. More complex filters can be made by combining multiple filters in series (chaining outputs to inputs) or parallel (summing outputs).	Remember	CO5	CLO 24	AEC022.24
20	Distinguish between DFT and DTFT.	DFT is obtained by performing sampling operation in both time and frequency domain whereas DTFT is obtained by performing sampling operation in time domain only. DFT has discrete frequency spectrum and DTFT has continuous frequency spectrum	Remember	CO5	CLO 24	AEC022.24
21	What is the Wiener Khintchine theorem	Wiener–Khinchin–Einstein or Khinchin–Kolmogorov theorem, states that the autocorrelation function of a wide-sense-stationary random process has a spectral decomposition given by the power spectrum of that process	Remember	CO5	CLO 24	AEC022.24
22	What is IDTFT	$x(n) = \frac{1}{2\pi} \int_{-\pi}^{\pi} X(e^{j\omega}) e^{jn\omega} d\omega$ it transforms continuous frequency spectrum signal into discrete time signal	Remember	CO5	CLO 24	AEC022.24
23	What do you understand circular shifting	Given finite duration convert into periodic sequence and apply linear shifting operation and then extract one period of periodic	Remember	CO5	CLO 24	AEC022.24

	operation	sequence this is called as circular shifting				
24	What is decimation in time radix -2 FFT algorithms	This algorithm is based upon that of decomposing the computation of DFT of sequence length N into successively a\smaller and smaller DFTs	Understand	CO5	CLO 24	AEC022.24
25	Define the Structure of IIR filter.	IIR filters are of recursive type whereby the present o/p sample depends on present i/p, past i/p samples and o/p samples.	Understand	CO5	CLO 24	AEC022.24
26	What is warping effect	The effect of the non-linear compression at high frequencies is called warping effect	Remember	CO5	CLO 24	AEC022.24
27	What is the mapping of bilinear transformation?	The mapping for the bilinear transformation is a one-to-one mapping that is for every point Z, there is exactly one corresponding point S,	Remember	CO5	CLO 23	AEC022.23
28	Define pre-warping.	The effect of the non-linear compression at high frequencies can be compensated. this compression can be compensated by introducing a suitable pre-scaling, or pre-warping the critical frequencies by using the formula.	Remember	CO5	CLO 25	AEC022.25
29	What is the transposition theorem & transposed structure	According to transposition theorem if we reverse the directions of all branch transmittance and interchange the input and output in the flow graph, the system function remains unchanged.	Understand	CO5	CLO 24	AEC022.24
30	What are the important features of IIR filter	No linear phase and desired magnitude response characteristics are the important features in IIR filter design specifications	Remember	CO5	CLO 24	AEC022.24
31	What is Half-band filter	A type of FIR filter where the transition region is centered at one quarter of the sampling rate,	Remember	CO5	CLO 24	AEC022.24
32	What is Transversal Filter	It is another name for standard FIR filter implementations, where the input samples traverse their way through the delay elements of a FIR filter.	Understand	CO5	CLO 25	AEC022.25
33	What is Parks-McClellan Method	The Parks-McClellan method (inaccurately called “Remez” by Matlab) is probably the most widely used FIR filter design method.	Remember	CO5	CLO 25	AEC022.25
34	What is lattice structure	The filter structure is feedforward and the net impulse response is finite length. Lattice filters are used in a variety of adaptive filter applications	Remember	CO5	CLO 25	AEC022.25
35	What is FIR tap	A FIR “tap” is simply a coefficient/delay pair. The number of FIR taps, (often designated as “N”) is an indication of 1) the amount of memory required to implement the filter, the number of calculations required.	Understand	CO5	CLO 25	AEC022.25
36	Define Interpolation filter.	Since up-sampling causes periodic repetition of the basic spectrum, the unwanted images in the spectra of the up-sampled signal must be removed by using a low pass filter H(z).	Remember	CO5	CLO 25	AEC022.25

37	Define decimation.	Decimation is the process of reducing the sampling rate. In practice, this usually implies low pass-filtering a signal, then throwing away some of its samples.	Remember	CO5	CLO 25	AEC022.25
38	What is Delta-sigma quantizer	The coarsely-quantized output of a delta-sigma modulator is occasionally used directly in signal processing or as a representation for signal storage.	Understand	CO5	CLO 24	AEC022.24
39	What is quantization step size	Quantization step size, in mathematics and digital signal processing, is the process of mapping input values from a large set to output values in a smaller set, often with a finite number of elements.	Remember	CO5	CLO 25	AEC022.25
40	What is a zero-input oscillation	In the study of dynamical systems with two-dimensional phase space, a limit cycle is a closed trajectory in phase space having the property that at least one other trajectory spirals into it either as time approaches infinity or as time approaches negative infinity.	Remember	CO5	CLO 25	AEC022.25
41	What is complex multirate system	A multi-rate DSP system uses multiple sampling rates within the system. Whenever a signal at one rate has to be used by a system that expects a different rate, the rate has to be increased or decreased, and some processing is required to do so.	Understand	CO5	CLO 25	AEC022.25

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