SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

VI SEMESTER

EE3663 -MICROPROCESSORS AND MICROCONTROLLERS

Regulation – 2023

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Prepared by

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

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SUBJECT : EE3663 -MICROPROCESSORS AND MICROCONTROLLERS

SEM / YEAR : III / VI

UNIT-I - 8085 PROCESSOR

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts – Memory Interfacing

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	What is microprocessor? Give the power supply &clock frequency of 8085	BTL1	Remember	CO1
2.	What are the functions of an accumulator?	BTL 2	Understand	CO1
3.	Classify the types 8085 flags?	BTL 4	Analyze	CO1
4.	Discover why data bus is bi-directional?	BTL 3	Apply	CO1
5.	List the registers of 8085 Processor	BTL 5	Evaluate	CO1
6.	Mention the uses of ALE in 8085 microprocessor .	BTL2	Understand	CO1
7.	List out the machine cycles of 8085 microprocessor.	BTL 1	Remember	CO1
8.	Define Address Bus and Data Bus.	BTL 1	Remember	CO1
9.	What is the function of HOLD and HLDA in 8085 microprocessor?	BTL 4	Analyze	CO1
10.	State any four pins of 8085 processor which are used to generate control and status signals	BTL2	Understand	CO1
11.	Explain the tri-state logic?	BTL 5	Evaluate	CO1
12.	Mention the purpose of SID and SOD lines	BTL 6	Create	CO1
13.	Tabulate the functions of the two status signals S0 and S1 in 8085 Microprocessor.	BTL 1	Remember	CO1
14.	List out the machine cycle for executing the instruction MVI A,34H	BTL 1	Remember	CO1
15.	Describe is the function of program counter in 8085 microprocessor?	BTL 3	Apply	CO1
16.	Summarize the function of trap interrupt and its significance?	BTL 2	Understand	CO1
17.	Examine the memory mapping in 8085 Microprocessor.	BTL 1	Remember	CO1
18.	Illustrate the basic concepts in the memory interfacing?	BTL 3	Apply	CO1
19.	Compose the function of parity flag and zero flag in 8085?	BTL 6	Create	CO1

20.	Discuss about the interrupts 8085 microprocessor.		BTL 4	Analyze	CO1
21.	Define instruction cycle, machine cycle and T-state?		BTL1	Remembering	CO1
22.	What is the signal classification of 8085?		BTL6	Understanding	CO1
23.	List the allowed register pairs of 8085.		BTL6	Creating	CO1
24.	What is meant by interrupt?		BTL5	Evaluating	CO1
25.	Discuss is the use of stack pointer?		BTL6	Creating	CO1
	PART-B				
1.	Explain with a neat block diagram the architecture of 8085microprocessor.	(16)	BTL1	Remembering	CO1
2.	Describe the pin configuration of 8085 processor and explain them in detail.	(16)	BTL2	Understanding	CO1
3.	Label the timing diagram for memory read and write operations and explain.	(16)	BTL3	Applying	CO1
4.	Explain the Timing diagram of STA $526A_H$.	(16)	BTL6	Creating	CO1
5.	Explain the memory organization of a microprocessor-based system. Discuss different types of memory and their characteristics.	(16)	BTL2	Understanding	CO1
6.	Analyze the input and output interfacing techniques used in 8085 microprocessor.	(16)	BTL1	Remembering	CO1
7.	Evaluate the timing diagram for LHLD 16-bit address.	(16)	BTL3	Applying	CO1
8.	Explain the hardware and software interrupts available in 8085 along with their vector address.	(16)	BTL4	Analyzing	CO1
9.	(i)Explain the function of the various interrupts available with 8085 microprocessor. (ii) Explain the registers of 8085 microprocessor.	(8) (8)	BTL1	Remembering	CO1
10.	Interpret the timing diagram for MOV A, M.	(16)	BTL2	Understanding	CO1
11.	(i) What do you mean by polling in 8085? (ii) List out the Maskable and Non-Maskable interrupts available in an 8085 processor. (iii) Label and explain the flag register of 8085 in brief.	(6) (5) (5)	BTL1	Remembering	CO1
12.	Discuss in detail about the timing diagram for MVI A, 32H.	(16)	BTL4	Analyzing	CO1
13.	Generalize the data transfer concepts of 8085 processor.	(16)	BTL1	Remembering	CO1
14.	Explain the concept of Direct Memory Access (DMA) with block diagram	(16)	BTL5	Evaluating	CO1
15.	Express the timing diagram of Opcode Fetch machine cycle.	(16)	BTL6	Creating	CO1
16.	Evaluate the timing diagram of OUT instruction.	(16)	BTL3	Applying	CO1
17.	Explain the interfacing of RAM and ROM with a microprocessor using suitable examples.	(16)	BTL2	Understanding	CO1
18.	Compose the operation of memory mapped I/O and I/O mapped I/O.	(16)	BTL3	Applying	CO1

UNIT-II - PROGRAMMING OF 8085 PROCESSOR

Instruction -format and addressing modes – Assembly language format – Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing – Look up table - Subroutine instructions - stack.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	What is an instruction format?	BTL 3	Apply	CO2
2.	Classify the addressing modes of 8085 processor.	BTL 3	Apply	CO2
3.	Discuss the function of CALL instruction.	BTL 2	Understand	CO2
4.	List different instruction formats.	BTL 1	Remember	CO2
5.	Tabulate the functions of Rotate instructions? Give example.	BTL 1	Remember	CO2
6.	Compose the similarity and difference between compare and subtract instructions.	BTL 6	Create	CO2
7.	State any four data transfer instruction and its function	BTL 6	Create	CO2
8.	Explain the purpose of the I/O instructions IN and OUT	BTL 4	Analyze	CO2
9.	Differentiate MVI and MOV instructions.	BTL 2	Understand	CO2
10.	If the 8085 adds 87H and 79H, specify the contents of the accumulator and the status of the S,Z and CY flag	BTL 4	Analyze	CO2
11.	Summarize the function of SIM Instruction in 8085?	BTL 5	Evaluate	CO2
12.	What is a subroutine. Mention the instructions related to subroutine in 8085 microprocessor?	BTL 5	Remember	CO2
13.	Discuss significance of 'XCHG' and 'SPHL' instructions?	BTL 2	Understand	CO2
14.	Examine the functioning of CMP instruction.	BTL 1	Remember	CO2
15.	Explain the function of given 8085 instructions: CPI and RRC.	BTL 4	Analyze	CO2
16.	Explain LDA AND DAA instructions	BTL 1	Remember	CO2
17.	Examine the size of data, address, and memory word and memory capacity of 8085 microprocessor.	BTL 3	Apply	CO2
18.	Define stack and stack related instructions.	BTL 1	Remember	CO2
19.	Explain about the lookup table?	BTL 5	Evaluate	CO2
20.	Describe the purpose of NOP instruction.	BTL 1	Remember	CO2
21.	Why do we use XRA A instruction?	BTL1	Remembering	CO2
22.	Compare CALL and PUSH instructions	BTL2	Understanding	CO2
23.	What are subroutine?	BTL3	Applying	CO2
24.	Compare RET and POP	BTL4	Analyzing	CO2
25.	List the four instructions which control the interrupt structure of the 8085 microprocessor?	BTL5	Evaluating	CO2

PART-B

1.	List and define the addressing modes supported by 8085 microprocessor with examples.	(16)	BTL1	Remembering	CO2

2.	Write an assembly language program to multiply two 8-bit numbers using repeated addition..	(16)	BTL2	Understanding	CO2
3.	Define the addressing mode. Identify the addressing modes of the following instruction and explain them. (i)STA 6350H (ii)CMA (iii)MOV A,M (iv)MOV D,E (v)MVI A, A7H	(1) (3) (3) (3) (3) (3)	BTL3	Applying	CO2
4.	Identify a suitable assembly language program for (i)Adding a set of n numbers. (ii)Finding the largest of two numbers stored in memory.	 (8) (8)	BTL2	Understanding	CO2
5.	Describe the data manipulation instructions of 8085.	(16)	BTL1	Remembering	CO2
6.	(i)Explain an 8085 assembly language program to sort numbers in ascending orders. (ii) Explain an 8085 assembly language program to sort numbers in descending orders.	(8) (8)	BTL3	Applying	CO2
7.	(i)Describe in detail classification of 8085 instruction set. (ii)Evaluate an assembly language program to find the largest number in an array.	(8) (8)	BTL4	Analyzing	CO2
8.	Demonstrate an assembly language program to generate the square wave form using DAC. Assume the TON=70%	(16)	BTL1	Remembering	CO2
9.	Explain the various arithmetic instructions of 8085 with illustrative examples?	(8)	BTL2	Understanding	CO2
10.	(i) Describe the interrupt structure of 8085 microprocessor and compare the same with 8085 microprocessor. (ii) Identify a suitable assembly language program to generate a time delay of 1ms. Show the calculations	(8) (8)	BTL1	Remembering	CO2
11.	(i)Describe with suitable example the operation of stack. (ii) Estimate the similarities and differences of CALL and RET instructions with PUSH and POP instructions.	(8) (8)	BTL4	Analyzing	CO2
12.	(i)Describe with a suitable 8085 assembly language program the use of subroutine instructions. (ii)Distinguish an assembly language program to generate Fibonacci series using subroutines.	(8) (8)	BTL3	Applying	CO2

13.	Describe conditional and unconditional branching instructions and explain their applications.	(16)	BTL5	Evaluating	CO2
14.	Differentiate between the following instructions clearly (i) Push and POP (ii) CALL and Jump (iii) ADD and ADC (iv) INC and INX (v) MOVB,B and MOVB,A	(16)	BTL6	Creating	CO2
15.	Illustrate the contents of stack memory and registers when PUSH and POP instructions are executed and explain how memory pointers are exchanged.	(8) (8)	BTL1	Remembering	CO2
16.	(i)Apply an assembly language program to find two's complement of a 16 bit data. (ii) Illustrate an assembly language program to add a set of n numbers.	(8) (8)	BTL2	Understanding	CO2
17.	Define the addressing mode. Identify the addressing modes of the following instruction and explain them. (i)STA 6350H (ii)CMA (iii)MOV A,M (iv)MOV D,E (v)MVI A, A7H	(16)	BTL3	Applying	CO2
18.	(i) Explain the loop structure with counting and indexing in 8085 programming. (ii) Write an 8085 program to count the number of even and odd numbers in a given set of numbers.	(8) (8)	BTL5	Evaluating	CO2

UNIT-III - 8051 MICRO CONTROLLER

Hardware Architecture, pinouts – Functional Building Blocks of Processor – Memory organization – I/O ports and data transfer concepts– Timing Diagram – Interrupts - Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Explain the operating mode 0 of 8051 ports	BTL-4	Analyze	CO3
2.	Discuss the function of TMOD register in 8051 microcontroller	BTL-2	Understand	CO3
3.	What the addressing modes of 8051 microcontroller?	BTL-4	Analyze	CO3
4.	Define Program status word?	BTL-1	Remember	CO3
5.	Explain the application of bit wise instruction?	BTL-4	Analyze	CO3
6.	Discuss PCON register?	BTL-2	Understand	CO3
7.	Discover in which ports of 8051 are bit addressable?	BTL-3	Apply	CO3
8.	State any four inbuilt features of 8051 microcontroller.	BTL-1	Remember	CO3
9.	List the significance of PSEN and EA pin in 8051 microcontroller.	BTL-1	Remember	CO3
10.	List the on-chip peripherals of 8051 microcontroller.	BTL-1	Remember	CO3
11.	List the alternative functions assigned to Port 3 pins of 8051 microcontroller.	BTL-1	Remember	CO3
12.	Explain the applications of 8051 microcontroller?	BTL-5	Evaluate	CO3
13.	Compare the I/O capabilities of 8051 and 8085.	BTL-3	Apply	CO3
14.	Compose the flags available in 8051?	BTL-6	Create	CO3
15.	Name the interrupts of 8051 microcontroller.	BTL-1	Remember	CO3
16.	Show the purpose of timing diagram in 8051 microcontroller?	BTL-3	Apply	CO3
17.	Distinguish between microprocessor and microcontroller.	BTL-2	Understand	CO3
18.	Explain the function of SM2 bit in the SCON register of 8051?	BTL-5	Evaluate	CO3
19.	Give the vector address and priority sequence of 8051 interrupts?	BTL-2	Understand	CO3
20.	How multiplication function is performed in 8085 and 8051?	BTL-6	Create	CO3
21.	State the purpose of the instruction register and decoder.	BTL1	Remembering	CO3
22.	Define the function of accumulator in 8051.	BTL2	Understanding	CO3
23.	State the purpose of data pointer (DPTR).	BTL3	Applying	CO3
24.	Define Special Function Registers (SFRs).	BTL4	Analyzing	CO3
25.	What is the function of INC and DEC instructions?	BTL3	Applying	CO3

PART-B

1.	Draw and explain the pin configuration of the 8051 microcontroller	(16)	BTL1	Remembering	CO3
2.	Discuss with a neat block diagram the architecture of 8051 microcontroller.	(16)	BTL2	Understanding	CO3
3.	Define the I/O ports and their functions of 8051 microcontroller.	(16)	BTL3	Applying	CO3
4.	Explain the internal and external memory organization of the 8051 microcontroller with suitable diagrams.	(16)	BTL2	Understanding	CO3
5.	(i)Explain how the internal timers are used to generate time delay by using 8051 microcontroller. (ii)Explain program memory interfacing in 8051 microcontroller.	(8) (8)	BTL1	Remembering	CO3
6.	Explain the control and I/O instructions of the 8051 microcontroller with suitable program illustrations.	(16)	BTL3	Applying	CO3
7.	(i) Define the vectored interrupts in 8051 microcontroller. (ii)Define the different addressing modes of 8051 microcontroller.	(8) (8)	BTL4	Analyzing	CO3
8.	(i)Briefly discuss about interrupts used in 8051 microcontroller. (ii)Discuss about the organization of internal RAM and special function registers of 8051 microcontroller in detail.	(8) (8)	BTL1	Remembering	CO3
9.	Explain the timing diagram of the 8051 microcontroller. Describe machine cycle, clock cycle, and instruction cycle in detail	(16)	BTL2	Understanding	CO3
10.	(i)Describe in detail the different methods of memory address decoding in 8051. (ii)Describe the operation of stack in 8051.	(8) (8)	BTL1	Remembering	CO3
11.	Describe the timing diagram of external data memory read cycle of 8051.	(16)	BTL4	Analyzing	CO3
12.	Define the Timers of 8051 microcontroller with relevant diagrams.	(16)	BTL3	Applying	CO3
13.	Differentiate between MOV, MOVC, and MOVX instructions of the 8051 microcontroller. Explain their addressing modes and applications with examples.	(16)	BTL5	Evaluating	CO3
14.	Explain data transfer concepts in the 8051 microcontroller	(16)	BTL6	Creating	CO3
15.	(i)Prepare an 8051 assembly language program to	(8)	BTL1	Remembering	CO3

	multiply the given number 48H and 30H. (ii)Compose the types of addressing mode with suitable example in 8051.	(8)			
16.	(i) Explain the interrupt structure of 8051 microcontroller. (ii) Explain the RAM structure of 8051 microcontroller	(8) (8)	BTL2	Understanding	CO3
17.	Explain how programming concepts in 8051 differ from 8085 with respect to I/O handling, memory access, and instruction execution.	(16)	BTL3	Applying	CO3
18.	State the data manipulation instructions of the 8051 microcontroller and mention its functions.	(16)	BTL2	Understanding	CO3

UNIT-IV - PERIPHERAL INTERFACING

Study on need, Architecture, configuration and interfacing, with ICs: 8255, 8259, 8254, 8279 - A/D and D/A converters & Interfacing with 8085 & 8051.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	Why are peripheral ICs required in microprocessor systems?	BTL-6	Create	CO4
2.	Discuss the working modes of 8254 timer?	BTL-2	Understand	CO4
3.	Explain the features used mode 2 in 8255?	BTL-4	Analyze	CO4
4.	Define the internal registers available in 8259 PIC?	BTL-1	Remember	CO4
5.	Illustrate the salient features of INTEL 8259 programmable interrupt controller?	BTL-3	Apply	CO4
6.	Draw the command word format of 8255 in I/O mode.	BTL-1	Remember	CO4
7.	List the output terminals in USART 8251?	BTL-1	Remember	CO4
8.	State the application of 8251 and 8279 ICs.	BTL-3	Apply	CO4
9.	Illustrate the 'Mode Word' format of 8251 USART.	BTL-3	Apply	CO4
10.	Describe the applications of D/A converter interfacing with 8255?	BTL-2	Understand	CO4
11.	How is keyboard interfaced with microprocessor?	BTL-2	Understand	CO4
12.	Label the use of ISR and PR registers in 8259 PIC	BTL-1	Remember	CO4
13.	What is the function of the DMA controller?	BTL-5	Evaluate	CO4
14.	Compose the function of scan section in 8279 programmable keyboard/display controller?	BTL-6	Create	CO4
15.	List the operation modes of 8255.	BTL-1	Remember	CO4
16.	Explain handshaking and what are the handshake signals?	BTL-4	Analyze	CO4
17.	Compare I/O interfacing in 8085 and 8051.	BTL-2	Understand	CO4
18.	Explain the cascade mode of 8259 programmable interrupt controller?	BTL-4	Analyze	CO4
19.	State two advantages of 8051 over 8085 in interfacing.	BTL-1	Remember	CO4
20.	List any two types of D/A converters.	BTL-5	Evaluate	CO4
21.	What is a D/A converter?	BTL1	Remembering	CO4
22.	What is the role of the control word in 8255?	BTL2	Understanding	CO4
23.	What is conversion time?	BTL3	Applying	CO4
24.	What is cascading in 8259?	BTL4	Analyzing	CO4
25.	Differentiate between scanned keyboard and encoded keyboard.	BTL2	Understanding	CO4

PART-B

1.	Describe with the Block diagram of 8255(PPI) and explain its various operating modes.	(16)	BTL-1	Remember	CO4
2.	Discuss the internal architecture of 8253 programmable interval timer.	(16)	BTL-2	Understand	CO4
3.	Define With a suitable interfacing circuit, explain D/A converter interfacing	(16)	BTL-1	Remember	CO4

4.	Explain with a neat diagram, the closed loop control of servomotor using microcontroller.	(16)	BTL-4	Analyze	CO4
5.	Discuss the various modes of operation of the programmable interval timer 8254.	(16)	BTL-2	Understand	CO4
6.	(i)Illustrate the control word of 8253 timer / counter and explain the operation modes of 8253 timer/counter. (ii)Examine why do we need A/D converter and D/A Converter? Draw the block diagram to interface 8085 microprocessor with A/D converter and D/A convertor.	(8) (8)	BTL-3 BTL-3	Apply Apply	CO4 CO4
7.	Describe the features of the IC 8279 keyboard/ display controller.	(16)	BTL-6	Create	CO4
8.	(i)Describe the block diagram and modes of the 8254 timer. (ii)Describe the architecture, functions and registers of the 8255 PPI.	(8) (8)	BTL-1 BTL-1	Remember Remember	CO4
9.	(i)Explain the architecture of 8259. (ii)How is 8259 interfaced with 8085 and 8051?	(10) (6)	BTL-2	Understand	CO4
10.	Explain how the serial data transfer can be performed using 8251 USART.	(16)	BTL-4	Analyze	CO4
11.	Illustrate and draw the interfacing of A/D and D/A converter interfacing to 8085 µp.	(16)	BTL-3	Apply	CO4
12.	(i)Explain the operation of 8255 PPI Port A programmed as input and output in mode 1 with necessary handshaking signals. (ii)Explain the parallel communication between two processors using mode 2 of 8255.	(8) (8)	BTL-4 BTL-4	Analyze Analyze	CO4
13.	Draw the architecture of DMA controller 8237 and describe.	(16)	BTL-1	Remember	CO4
14.	Explain the interfacing of DAC with 8051 or 8085 with a neat diagram and write a program to generate any typical waveform.	(16)	BTL-5	Evaluate	CO4
15.	Explain the working principle of Analog-to-Digital converters. Describe different types of A/D converters with merits and demerits.	(16)	BTL1	Remembering	CO4
16.	Explain the scanning and debouncing techniques used in the 8279 controller.	(16)	BTL2	Understanding	CO4
17.	Compare peripheral interfacing techniques of 8085 and 8051 with respect to control signals, addressing, and applications.	(16)	BTL3	Applying	CO4
18.	Explain the need for programmable peripheral ICs in microprocessor-based systems. Discuss memory-mapped and I/O-mapped interfacing with suitable examples.	(16)	BTL6	Creating	CO4

UNIT-V - MICRO CONTROLLER PROGRAMMING & APPLICATIONS

Simple programming exercises- key board and display interface –Control of servomotor - Temperature control system –stepper motor control- Application to automation systems. Arduino UNO Board-Architecture-Arduino IoT - Communications -Sensing- Displays. Raspberry Pi Development Board- Architecture - Raspberry Pi IoT - Usage of IDE for assembly language programming.

PART-A

Q. No	Questions	BT Level	Competence	CO
1.	What is meant by an embedded program?	BTL1	Remembering	CO5
2.	Define polling in embedded programming.	BTL2	Understanding	CO5
3.	What is a keyboard interface?	BTL1	Remembering	CO5
4.	Define key debouncing.	BTL2	Understanding	CO5
5.	What is a seven-segment display?	BTL3	Applying	CO5
6.	How is position control achieved in a servomotor?	BTL3	Applying	CO5
7.	What is a servomotor?	BTL1	Remembering	CO5
8.	What is a temperature control system?	BTL5	Evaluating	CO5
9.	State the role of a controller in temperature control?	BTL2	Understanding	CO5
10.	Define step angle.	BTL4	Analyzing	CO5
11.	Give the difference between full-step and half-step operation?	BTL1	Remembering	CO5
12.	What is automation?	BTL4	Analyzing	CO5
13.	State the advantages of automation systems.	BTL2	Understanding	CO5
14.	What is a real-time system?	BTL4	Analyzing	CO5
15.	What is Arduino UNO?	BTL3	Applying	CO5
16.	Mention the functions of the USB interface in Arduino UNO?	BTL1	Remembering	CO5
17.	What is Arduino IoT?	BTL1	Remembering	CO5
18.	Mention the function of an LCD in IoT systems?	BTL6	Creating	CO5
19.	Give two examples of sensors used in IoT applications.	BTL6	Creating	CO5
20.	What is Raspberry Pi?	BTL5	Evaluating	CO5
21.	Name the processor used in Raspberry Pi.	BTL1	Remembering	CO5
22.	Enumerate any two communication interfaces available in Raspberry Pi.	BTL2	Understanding	CO5
23.	Give short notes on debugging.	BTL3	Applying	CO5
24.	Summarize cross-compiler	BTL4	Analyzing	CO5
25.	What is an Integrated Development Environment (IDE)?	BTL1	Remembering	CO5

PART-B

1.	Explain simple embedded programming concepts with suitable examples. Describe polling, delays, and infinite loop structures.	(16)	BTL1	Remembering	CO5
2.	Explain the keyboard and display interfacing	(16)	BTL2	Understanding	CO5

	technique used in embedded systems with neat block diagrams and sample programs.				
3.	Explain the working principle and control of a servomotor using a microcontroller or Arduino.	(16)	BTL3	Applying	CO5
4.	Explain stepper motor construction, working principle, and control methods.	(16)	BTL2	Understanding	CO5
5.	Compare servomotor and stepper motor control techniques with suitable applications.	(16)	BTL1	Remembering	CO5
6.	Explain the design of a temperature control system using sensors, controller, and actuators with a neat block diagram.	(16)	BTL3	Applying	CO5
7.	Describe the role of embedded systems in industrial automation. Explain different automation applications.	(16)	BTL4	Analyzing	CO5
8.	Explain the architecture of the Arduino UNO board with a neat block diagram. Describe the function of each block.	(16)	BTL1	Remembering	CO5
9.	Explain Arduino programming structure and development environment with an example program.	(16)	BTL2	Understanding	CO5
10.	Describe Arduino-based IoT systems. Explain communication, sensing, and display modules used in IoT applications.	(16)	BTL1	Remembering	CO5
11.	Explain different communication protocols used in Arduino IoT systems such as UART, I2C, SPI, and Wi-Fi.	(16)	BTL4	Analyzing	CO5
12.	Explain the interfacing of sensors and display devices with Arduino for IoT applications.	(16)	BTL3	Applying	CO5
13.	Explain the architecture of the Raspberry Pi development board with a neat block diagram.	(16)	BTL5	Evaluating	CO5
14.	Describe Raspberry Pi-based IoT architecture and its applications.	(16)	BTL6	Creating	CO5
15.	Explain the usage of IDE for assembly language programming. Describe editing, assembling, compiling, debugging, and downloading steps.	(16)	BTL1	Remembering	CO5
16.	Compare microcontroller-based development (Arduino) and single-board computer-based development (Raspberry Pi) for embedded and IoT applications.	(16)	BTL2	Understanding	CO5
17.	Explain the application of embedded systems in automation such as motor control, temperature monitoring, and display systems.	(16)	BTL3	Applying	CO5
18.	Explain a complete automation system using Arduino or Raspberry Pi with suitable block diagram and explanation.	(16)	BTL5	Evaluating	CO5

Course Outcome:
➢ Ability to acquire knowledge in Addressing modes & instruction set of 8085 &8051.
➢ Ability to need & use of Interrupt structure 8085 & 8051.
➢ Ability to understand the importance of Interfacing.
➢ Ability to explain the architecture of Microprocessor and Microcontroller and its applications.
➢ Ability to write the assembly language programme.