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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

ELECTRONICS AND COMMUNICATION ENGINEERING

Fifth Semester

EC5551 MICROPROCESSORS AND MICROCONTROLLERS

(Regulation2019)

Time: 3 Hours **Max.Marks: 100**

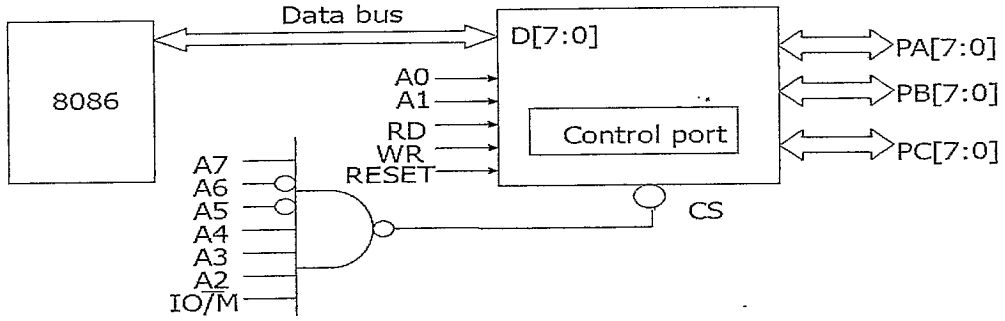
CO1	Ability to analyze and develop the assembly language program for microprocessor 8085 and 8086
CO2	Ability to interface peripherals with Microprocessors and Microcontrollers
CO3	Ability to analyze and develop the assembly language program for microprocessor 8051
CO4	Ability to design and create microcontroller based system
CO5	Ability to analyze architecture and develop assembly language program for ARM 32 bit processor

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A (10x2=20Marks)

(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	An 8085 microprocessor operates at a clock frequency of 3 MHz. If an instruction takes 3.3 microseconds to execute, calculate the number of T states required for its execution.	2	1	L3
2	A memory connected to a microprocessor has 20 address lines and 16 data lines. What will be the memory capacity?	2	1	L3
3	Determine the specific memory address assigned to the control register of the 8255 in the given schematic diagram.	2	2	L5
				
4	Draw the pin details of DAC 0808.	2	2	L1
5	What is the function of the GATE-bit in the TMOD register of the 8051 microcontroller?	2	3	L2
6	What crystal frequency is typically used in 8051 microcontrollers for serial communication, and why is this frequency chosen?	2	3	L3
7	What is the I2C protocol, and what are its advantages?	2	4	L2

P.T.O

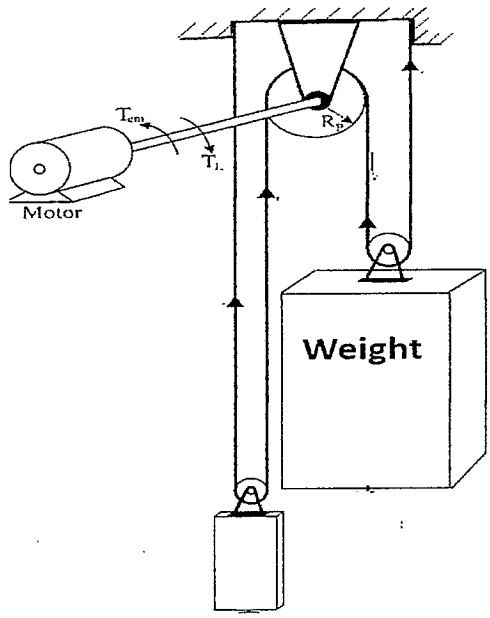
8	Give the pin details of (16X2) LCD display.	**2**	**4**	**L1**
9	What is AMBA bus Protocol?	**2**	**5**	**L1**
10	What is the role of barrel shifter in ARM processor?	**2**	**5**	**L2**

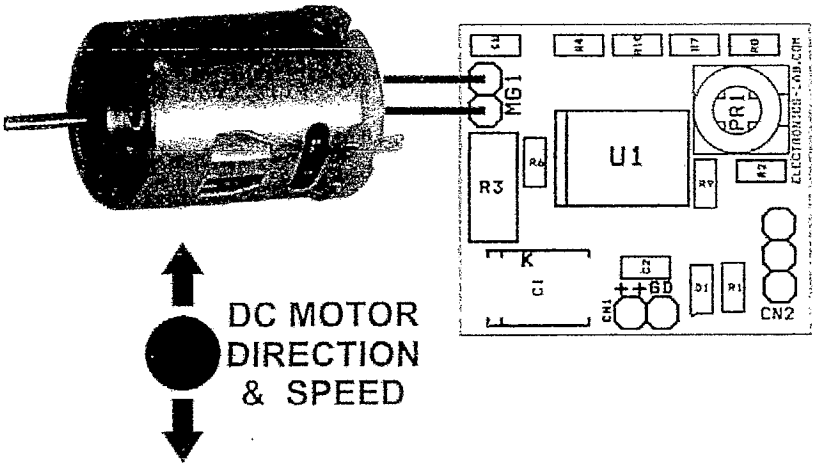
PART- B **(5x 13=65 Marks)**

Q.No.	Questions	Marks	CO	BL
11 (a)	Illustrate the hardware interrupts available in an 8085 microprocessor using a clear diagram. Additionally, discuss the distinction between vectored and non-vectored interrupts, their priorities, and triggering mechanisms.	**13**	**1**	**L2**
	OR			
11 (b)	Draw a detailed timing diagram illustrating the execution of the 8085 instruction CALL 6746H. Assume the initial values of the Program Counter (PC) and Stack Pointer (SP) to be 8456H and 6655H, respectively. Assume all other required and relevant details.	**13**	**1**	**L2**
12 (a)	Illustrate the internal architecture of the 8279 keyboard display controller IC using a clear diagram. Additionally, discuss its advantages and role in microprocessor based system design.	**13**	**2**	**L3**
	OR			
12 (b)	Illustrate the internal architecture of the 8255 programmable peripheral interface IC using a clear diagram. Additionally, discuss its advantages and role in microprocessor based system design	**13**	**2**	**L3**
13 (a)	Explain the various addressing modes used by the 8051 microcontroller, illustrating each mode with specific examples..	**13**	**3**	**L4**
	OR			
13 (b)	Provide a detailed diagram outlining the architectural structure, components and their interconnections within an 8051 microcontroller. Subsequently, explore the significant features of the 8051 and the purpose of its Special Function Registers (SFRs).	**13**	**3**	**L4**

P.T.O

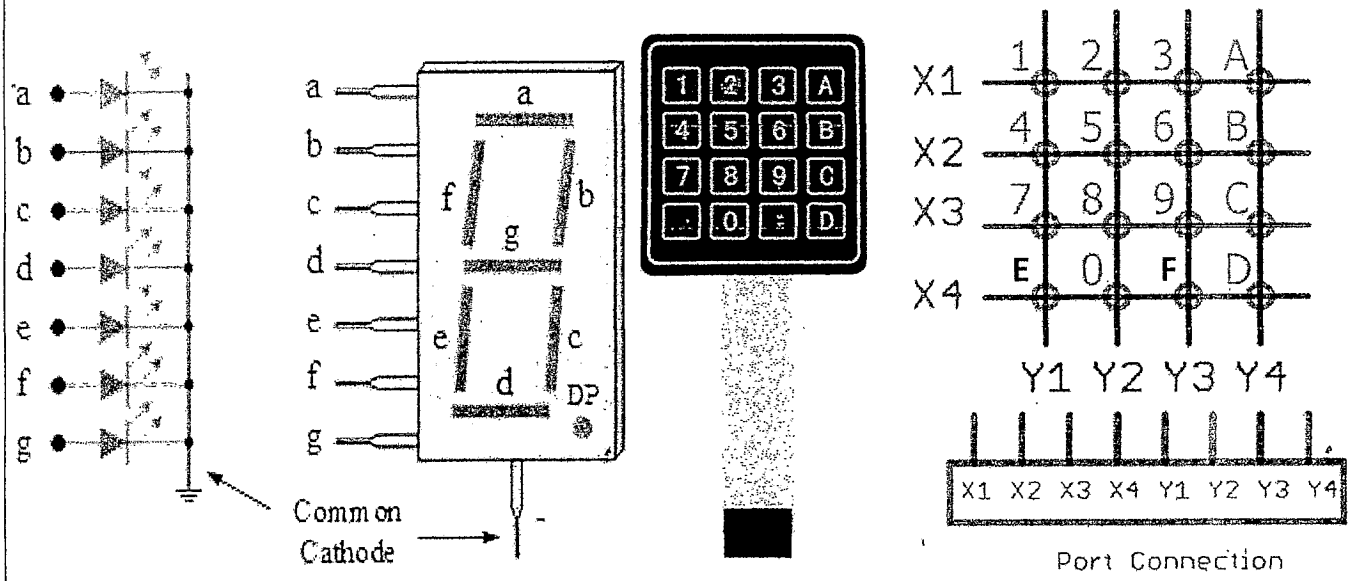
14(a)	Design a microcontroller-based system that utilizes Pulse-Width Modulation (PWM) to control the bidirectional speed of a DC motor for a lifting mechanism. Assume all other required and relevant details.	**13**	**4**	**L4**





OR

14(b)	Design a 8051 microcontroller-based system to interface a 4x4 keypad and a common cathode seven-segment display. Develop a comprehensive assembly code that efficiently scans the keypad, identifies key presses, and displays the corresponding digits on the seven-segment display. Assume all relevant hardware components and software modules.	**13**	**4**	**L4**



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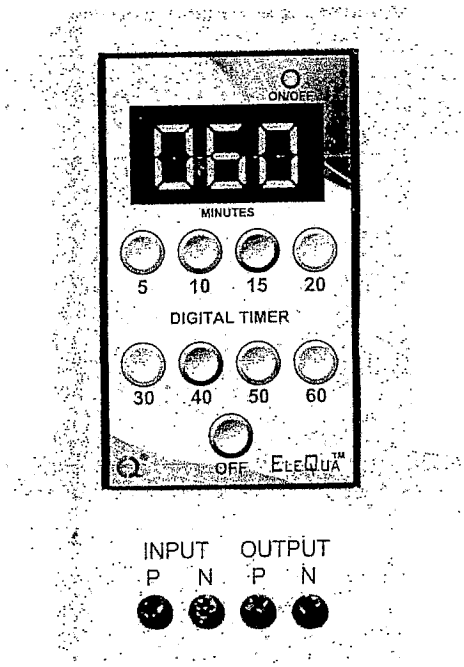
15 (a)	Provide a detailed diagram outlining the architectural components of an ARM processor. Subsequently, explore the roles of the Current Program Status Register (CPSR), Saved Program Status Register (SPSR), and the different operating modes that the processor can perform.	**13**	**5**	**L3**
	OR			
15 (b)	Provide a comprehensive overview of the nomenclature system employed for ARM processors. Subsequently, conduct a detailed examination of the architectural features and pipelining stages incorporated into ARM7, ARM9, and ARM10 processors.	**13**	**5**	**L3**

PART- C (1x 15=15Marks)

Q.No.	Questions	Marks	CO	BL
16.	Microcontroller based programmable Digital Timer for home appliance. (*Refer the image given Below*)	**15**	**4**	**L6**

Design a microcontroller-based digital timer that can be programmed with specific delay times of 5, 10, 15, 20, 30, 40, 50, or 60 minutes. Once activated, the timer should automatically control the power supply to appliances such as heater, oven, and water pumps. After the set time, the timer should automatically cut off the power. Provide a block diagram illustrating the system's components and their interactions. Also, create a schematic diagram detailing the circuit connections between the microcontroller, sensors, actuators, and other components. Finally, develop a pseudocode or flowchart outlining the step-by-step logic of the timer's operation. Assume suitable components for the design, including a microcontroller, real-time clock (RTC), EEPROM, switches, displays, and high-power devices.



About this item

- 8 Preset Time For Easy Operation.
- Micro control based Digital Timer with Display.
- Just press button according your Time requirement for automatic power cut off operation.
- Off Button For Emergency Stop.
- Single phase Max output load is 30AMPs/2HP @ 230V AC
- Older age people Can Operate Easily.
- Using This Product You can Prevent water overflow
- Made In INDIA Product