



POSTAL BOOK PACKAGE 2025

MECHANICAL ENGINEERING

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CONVENTIONAL Practice Sets

CONTENTS

ROBOTICS AND MECHATRONICS

1. Microprocessor and Microcontroller	2 - 6
2. Sensor and Other Device	7 - 16
3. Actuators and Stepper Motor	17 - 21
4. Control System	22 - 32
5. Robotics	33 - 47

Microprocessor and Microcontroller

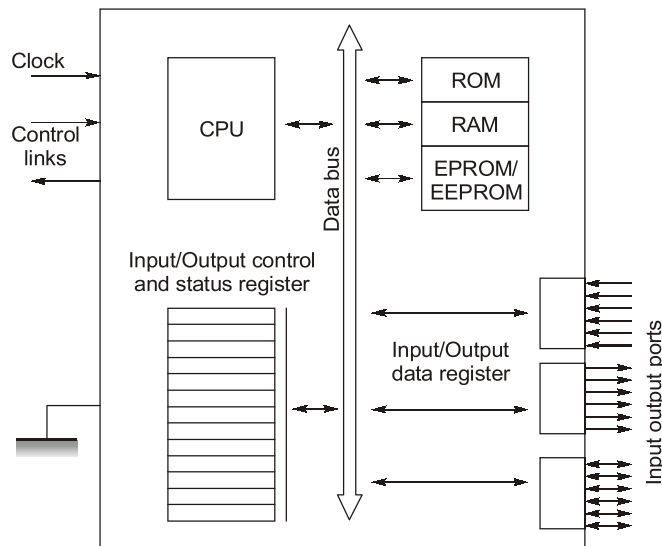
Q1 Given comparison between “Microprocessors” and “Microcontrollers”.

Solution:

Microprocessor	Microcontroller
1. It contains CPU, interrupt circuit and memory-addressing circuits.	1. Besides all parts of micro-processor, they also contain, timers, parallel and serial I/O, internal RAM and ROM.
2. Access time for memory and I/O device is more.	2. Access time for memory and I/O device is less.
3. Number of operational codes (for moving data from external memory to CPU) are many.	3. Only one or two operational codes (for moving data from external memory to CPU)
4. Nature of deal with rapid movement of codes and data are from external address to chip.	4. Nature of deal with rapid movement of codes and data are within the chip.
5. Operates as a digital computer by adding external digital parts.	5. Operational as a digital computer without adding external digital parts.
6. Memory map for data and code are single.	6. Memory map for data and code are separate.
7. More flexible.	7. Less flexible.

Q2 Sketch the block diagram of a microcontroller?

Solution:

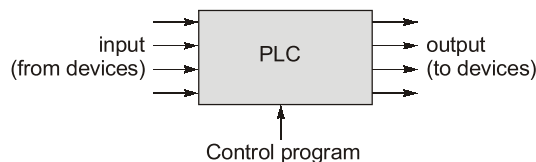


Block diagram of Microcontroller

Q3 What are programmable logic controllers (PLC). State the special features and advantages of PLCs.

Solution:

PLCs are specialized industrial device for interfacing input/output and controlling analog and digital devices.



(i) They are designed with a small instruction set suitable for industrial control application.

- (ii) Usually they are programmed with “ladder logic” which is graphical method of laying out the connectivity and logic between system input and output.
- (iii) They are designed with industrial control and industrial environments specifically in focus. Therefore in addition to being flexible and easy to program, they are robust and relatively immune to external interference.
- (iv) It is a ‘digital electronic device’ that uses a programmable memory to store instruction and to implement functions. Such as logic sequencing, timing, counting and arithmetic in order to control machines and process.

Special features of PLCs

- (i) Interfacing for input and output is inside the controller.
- (ii) Easily understood programmable language program is mainly concerned with logic and switching operation.
- (iii) Rugged and designed to withstand vibration, temperature, humidity and noise.

Advantage:

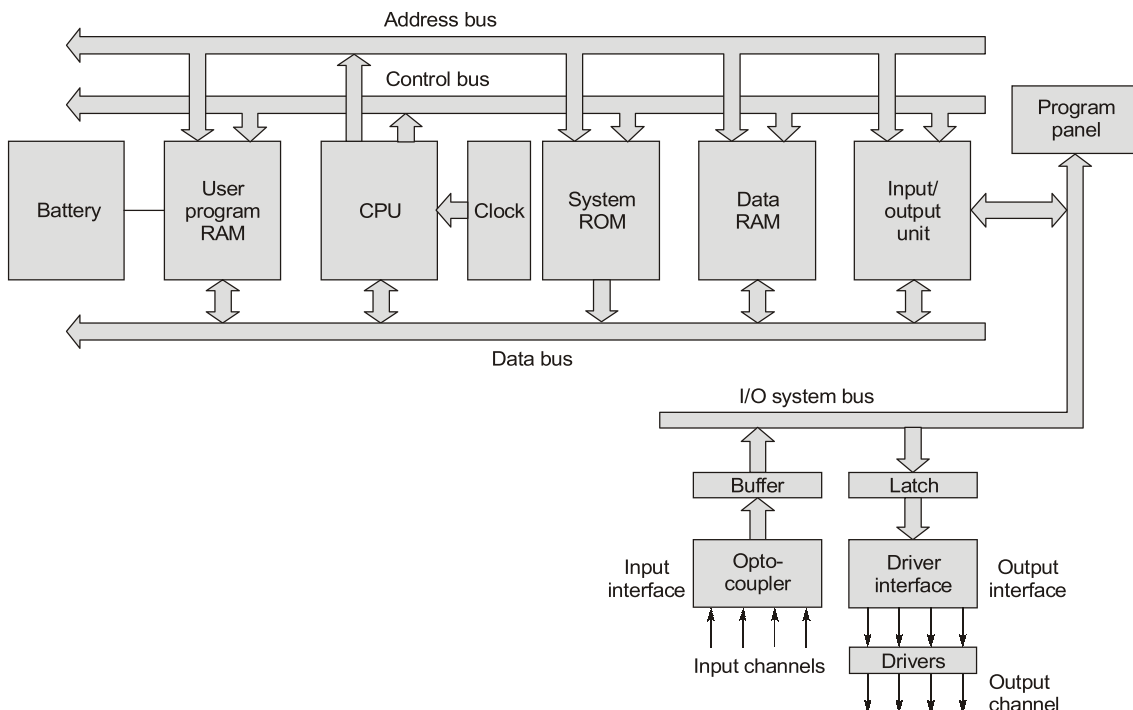
- (i) Low cost.
- (ii) Easy to install.
- (iii) Ensure increased productivity.
- (iv) Faster operational speed.
- (v) High reliability and ease maintenance.
- (vi) Can with stand harsh industrial environment.
- (vii) Provide constancy in manufacturing.
- (viii) Can input/output both analog and digital signal.
- (ix) Small size.
- (x) Easier trouble shooting.

Q4 Draw basic PLC structure/Architecture.

Solution:

PLC is a digital electronic device that uses a programmable memory to store instructions and to implement functions, such as logic, sequencing, timing, counting and arithmetic in order to control machines and processes and has been specifically designed to made programming easy.

Basic structure is



Architecture of a PLC

Q5 Explain briefly features of intel 8085 microprocessor with the help of a block diagram/architecture.

Solution:

It is an 8 bit microprocessor i.e. It can accept process, or provide 8 bit data simultaneously.

- It operates on a single +5V power supply connected at V_{CC} , power supply ground is connected to V_{SS} .
- It operates on clock cycle with 50% duty cycle.
- It has a chip clock generator.
- It can operate with a 3 MHz clock frequency. The 8085 A-2 version can operate at the maximum frequency of 5 MHz.
- It has 16 address lines, hence it can access (2^{16}) 64 kbytes of memory.
- It provides 8 bit I/O addresses to access (2^8) 256 I/O ports.
- It has 8-bit accumulator, flag register, instruction, six 8 bit general purpose register (*B C D E H* and *L*) and two 16 bit registers. (*SP* and *PC*).
- It has serial I/O control which allows serial communication.
- It supports 74 instruction with the following addressing modes.
(a) Immediate (b) Register (c) Direct (d) Indirect (e) Implied
- It has a mechanism by which it is possible to increase its interrupt handling capacity.

