

BCA Hons. Degree Part - I

Subject : IBM PC

Topic – Microprocessor System Design and Development

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Microprocessor System Design and Development

Designing a Microprocessor system begins with its specifications. Essentially all microprocessors include the following:

- (1) Input Devices.
- (2) Output Devices,
- (3) Memory Requirements.
- (4) System Clock Frequency.
- (5) Peripheral Devices needed.
- (6) Type of CPU needed.
- (7) Applications or Nature of Work.

Microprocessor System Design and Development

1. Input Device: The popular input-devices are: (i) Hex-keyboards, (ii) DIP switches, (iii) ADC interfaced through ports, (iv) Floppy disks-interfaced through INTEL-8272. The hex-keyboards are normally interfaced with INTEL-8279 (Keyboard and Display Control) - a maximum of 64 keys can be interfaced using 8279. Along with, Shift and Control, 256 keys-codes can be generated, using 8279.

Microprocessor System Design and Development

2. Output Devices: Likewise, popular output devices, used in single board HP (ie., microprocessors kit) are: (i) 7-segment LEDs interfaced to 8085 microprocessor, using INTEL-8279 (Keyboard and Display Controller) a maximum of 16 number of 7-segment LEDs can be interfaced, using one 8279 in 8085 microprocessor based system, as multiplexed-display. Often output devices are printers, floppy disks and CRT terminals. Special, dedicated controllers are needed to interface floppy-disks and CR T terminals. The INTEL-8272 or INTEL-82072 floppy disk controller and INTEL-8279 CRT controller are generally used with 8085/8086/8088 system.

Microprocessor System Design and Development

3.Memory Requirement: Memory-requirements of a Microprocessor system, mainly consists of the number of EPROMS and RAMs. Their capacities are estimated based on the applications and work to be performed by the Microprocessor . Genuinely they use memory with word-size of 1 byte, so the memory capacity is expressed in KBs.

Microprocessor System Design and Development

4. Clock-Frequency: As always pointed out, the μP or peripherals etc. require a clock-signal for synchronizing various internal operating devices. An oscillation is used to generate this signal. (Feed back type) using a crystal (Quartz). Normally in 8085 system, the Quartz crystal is connected externally. The clock-frequency is divisible to that of the internal-clock, as the divides it by 2 (for internal operation). Normally a microprocessor system are driven at its maximum speed, because the execution-time will be minimum, if the clock frequency is maximum. Of course, with this conditions, the peripherals should have speed-compatibility with the processor.

Microprocessor System Design and Development

5. Peripheral Devices: The peripherals-devices needed for a μP system, depends on its applications. Some of the important peripherals, that can be interfaced with 8085 μP based system are:

(1) INTEL-8253/8254, (2) INTEL-8255/8254, (3) INTEL-8255, (4) INTEL-8279, (5) INTEL-8259, (6) INTEL-8237/8257, (7) ADC and (8) DAC.

The last two devices are used only when the microprocessor based system has to monitor an analog signal from a sensor (interfacing ADC to 8255 ports). If the system has to control also the analog-signal, then it has to convert the digital-signal to analog signal - using DAC.

Microprocessor System Design and Development

(6) Type of CPU: As always mentioned, the CPU of the microprocessor system, is its microprocessor itself. It is chosen on (1) clock-speed, (ii) instruction-execution-time, (iii) memory capacity, (iv) sizes of data and address. (v) addressing modes and (vi) the operation, it is required to perform, and (vii) the number of additional devices needed to form the system.

(7) Applications/Nature of Work: The specifications of the microprocessor system mainly depend on its applications and the nature of work it is going to do, as all the others requirements (1 to 6) depend on the nature of work to be done by the system.

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