* **7.1- List three broad classifications of external, or peripheral devices.**
* Human readable.
* Machine readable.
* Communication.
* **7.2- What is the International Reference Alphabet?**
* Each character in this Alphabet is represented by a unique 7-bit binary code – 128 different characters can be represented.
* **7.3- What are the major functions of an I/O module?**
* Control and timing.
* Processor and communication.
* Device communication.
* Data buffering.
* Error detection.
* **7.4- List and briefly define three techniques for performing I/O.**
* Programmed I/O: the processor issues an I/O command to an I/O module; that process then busy-waits for the I/O operation to be completed before proceeding.
* Interrupt-drive I/O: The processor issues an I/O command, continues to execute other instructions, and is interrupted by the I/O module when latter has completed its work.
* Direct memory access: controls exchange of data between main memory and I/O module.
* **7.5- What is the difference between memory-mapped I/O and isolated I/O?**
* Memory-mapped I/O: there is a single address space for memory locations and I/O devices.
* Isolated I/O: a command specifies whether the address refers to a memory location or an I/O device.
* **7.6- When a device interrupt occurs, how does the processor determine which device issued the interrupt?**
* Using multiple interrupt lines: Most straightforward approach to the problem.
* Software polling: polling each I/O module to see which one caused the interrupt.
* Daisy chaining: with a message sent from the processor when it receives an interrupt, and the message going through each module until it reaches the module, which then sends an response to the processor.
* Using vectored interrupts for bus arbitration: The module takes over the bus line, and only one module can do so at a time.
* **7.7- When a DMA module takes control of a bus, and while it retains control of the bus, what does the** **processor do?**
* The processor either doesn't need to use the bus at the time, or it is forced to suspend operation temporarily. The processor deals with other things, while the bus operation is left to DMA.