1,
There are 512 bytes/sector. Since each byte generates an interrupt, there are 512 interrupts.
Total interrupt processing time for one sector is $2.5us \times 512 = 1280us$
Since the rotation speed is 360rpm, the time for one round is $\frac{1}{360/60} = \frac{1}{6}s$
The time to read one sector is $\frac{1}{6}s \div 96 \approx 1736us$
The percentage of time spending for handling I/O is 1280/1736=74%

2,
With DMA, there is only one interrupt of $2.5us$, therefore, the percentage of time spending for handling I/O is 2.5/1736=0.14%

3,
Let us ignore data read/write operations and assume the processor only fetches instructions. Then the processor needs access to main memory once every microsecond. The DMA module is transferring characters at a rate of 1200 Bytes per second, or one every $833us$. The DMA therefore "steals" one in every 833 microseconds. This slows down the processor approximately $\frac{1}{833} \approx 0.12\%$

4,
The fact that the printer sends an interruption at the completion of each character indicates that the printer accepts characters one at a time and programmed I/O is used to send character to the printers. The interrupt signal sent by the printer indicates that the printer is ready to accept a character for printing.
The print driver program is either located at memory location 6, or, more commonly, location 6 contains a JUNP instruction that jumps to the correct location for the driver program. When the interrupt occurs, the program loads the next available character into an accumulator and sends it to the printer with an output instruction. Then it increments the pointer that indicates the next character to be printed in the buffer and sits and waits for the next interrupt to occur. When the driver prints the last character, it returns controls to the calling program.

5,
Before a tape controller can manage a DMA transfer, it must have five pieces of information:
Where the data are stored (or to be stored) in the memory
Where the data are stored (or to be stored) on the tape
How many data are to be transferred
Which direction, tape-to-memory or vice-versa
When, exactly, to initiate the transfer
Programmed output instruction would be used to send this information to the tape controller.

6,
DMA accessing relates to I/O streaming, the lower memory access privilege of DMA could cause the delay of data exchange between peripheral hardware and memory, thus it could cause possible data loss. The other reason is that the program just can not carry out when certain kind of resource is out of the memory. The higher priority of DMA can be helpful.

7,
Without interrupt capability, the system would have no practical way of determining when a DMA transfer is complete, thus no way of knowing when it is safe to proceed with processing of the data used in the transfer.

8,
The use of a separate disk controller frees the CPU to perform other tasks. In particular, the disk controller can manage DMA transfers, which otherwise would have to be done by the CPU. The disk controller also manages the movement of the disk head and reading or writing of the data on the disk. Again, without the disk controller, the CPU would be forced to perform these operations.

9,
Most modern printers have their own memory, so that a block of characters can be transferred to the printer all at once. Thus, the printer can print at its own rate without tying up the CPU. The printer sends an interrupt to the CPU when it is ready to accept another block of data and when it has completed printing.