MODEL ANSWER

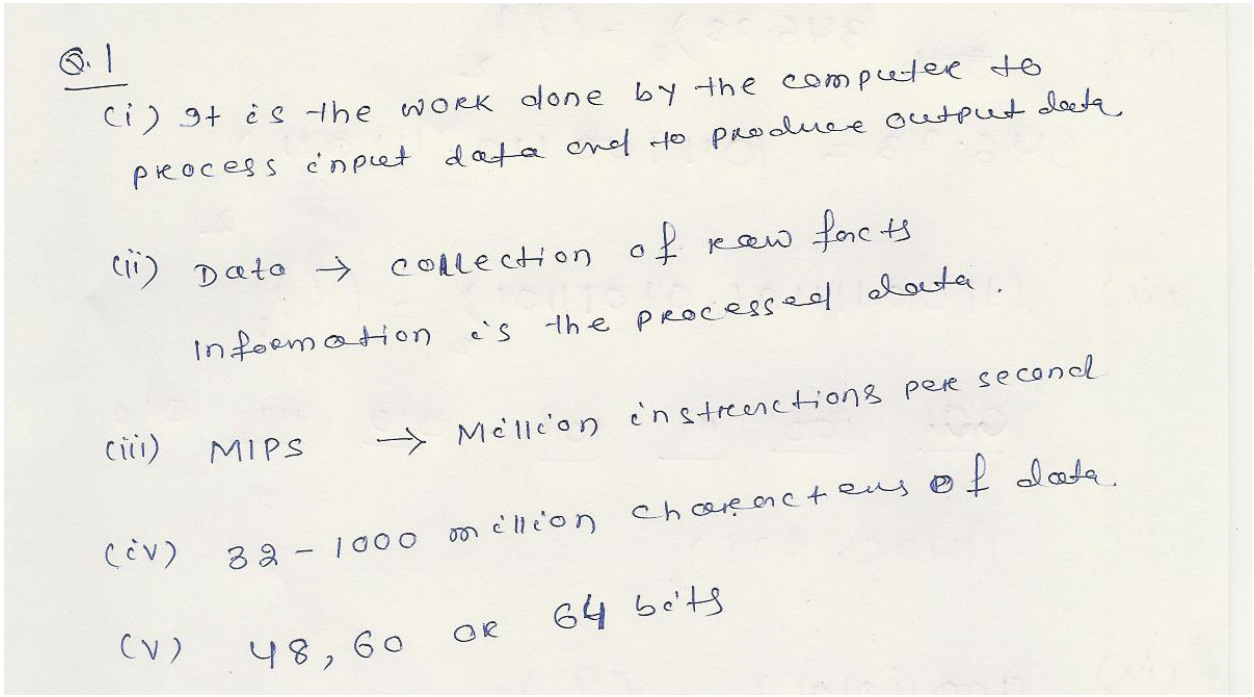
AS -2873

B.Sc.(Hon's) First semester Examination, 2013

Computer science, Paper : First, Fundamentals of Computer

1. (i) What is the meaning of processing in a computer?
   (ii)Differentiate between data and information.
   (iii)What is the full form of MIPS?
   (iv) A typical microcomputer memory units stores how much of data?
   (v) What is the word length of a mainframe computer?
   (vi) Differentiate between RAM and ROM.
   (vii) Define virus.
   (viii) How an optical mouse is different from a mechanical mouse?
   (ix) Differentiate between OCR and OMR.
   (x) Differentiate between multitasking and multi-programming operating system.

Solution:



(vi)

RAM	ROM
(1) Random access memory	(1) Read only memory
(2) Read and Write operation is possible	(2) only read operation is allowed
(3) Volatile in nature	(3) Non-volatile

(vii) It is a deviant program stored on a computer hard drive that can cause unexpected and often undesirable effects such as corrupting data.

(viii) Optical mouse uses a light beam to detect movement across a surface, whereas mechanical mouse uses a rotating ball for the same purpose.

(ix)

OCR	OMR
(1) Optical character reader	(2) Optical mark reader
(2) Detect printed or hand written characters	(2) Detects mark made by pen or pencil

1(x)

Multitasking	Multiprogramming
(1) Two or more programs can be executed by one user concurrently on the same computer Ex- Windows 95, 98, 2000 etc.	(1) In multiprogramming as the CPU always has one job to execute. Have more than on jobs resides in main memory, and hence the memory is utilized.

Q. 2 Describe the characteristics and drawback of a computer.

Characteristics of the computer

(1) Speed → It is related to the volume of data processed per unit of time. The speed is measured in
Micro second = 10^{-6} sec.
Nano second = 10^{-9} sec.
pico second = 10^{-12} sec.

(2) Accuracy → The degree of accuracy is depends on the design model of the computer. computer is based on the principle of Garbage-In-Garbage-Out, if wrong data is inputted then a wrong output will be produced.

(3) Reliability → It operates under the most advance conditions without showing any signs of fatigue. It is free from tiredness, monotony, lack of concentration etc

(4) Memory capability → It has unlimited capacity to store the data and recall any amount of information because of its secondary storage.

(5) Storage → Large no. of programs and data can be stored on the computer.

(6) Diligence → A computer can perform number of functions without suffering from tiredness, lack of concentration etc

Drawbacks of computer

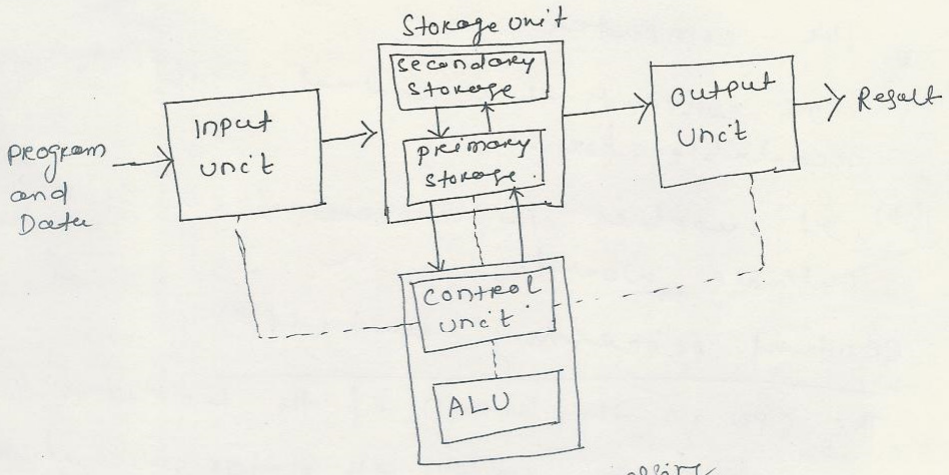
(1) Lack of decision making power
(2) No I.Q.
(3) No heuristics.

Q.3 Draw the basic architectural diagram of a computer and explain the function of each of its component.

Architecture of computer

(5)

A block diagram of the basic computer organization is given as follows:-



There are three major unit of an electronic digital computer. The units are input unit, output unit and central processing unit.

Input unit: The following functions are performed by an input unit:

- It provides a computer with data and instructions that are necessary to perform the task.
- It converts the input data in computer acceptable form.
- It supplies the conventional instructions and data to the computer system for further processing.

Ex: Keyboards, punched card, magnetic tape, mouse, Scanner etc.

Output Unit

The following functions are performed by an output unit :-

(1) It accepts the results produced by the computer.

(2) It converts these coded results to human readable form.

(3) It supplies the converted results to the outside world.

Central processing unit (CPU)

The CPU is the brain of the computer system. In a computer system all major calculations and comparisons are made inside the CPU and CPU is also responsible for activating and controlling the operations of other units of a computer system. The two basic components of a CPU are the control unit and the arithmetic logic unit.

Arithmetic Logic unit (ALU)

→ It is the place where the actual execution of the instructions takes place during the processing operation.

→ In general, all calculations are performed and all comparisons are made in the ALU.

→ The data stored in the primary storage are transferred to ALU, where processing takes place and intermediate and final results are transferred to storage.

→ The control unit tells the ALU which operation to perform and then see that necessary data to be supplied.

control unit

→ The control unit sequences the operation of the computer, controlling the actions of all other units.

→ It interprets the instructions and then directs the rest of the machines in its operation.

→ The control unit acts as a central nervous system coordinates the entire computer system.

storage unit

The functions of storage unit are to hold :-

(1) All the data to be processed and the instructions required for processing.

(2) Intermediate results of processing.

(3) Final results of processing before these results are released to an output device.

The storage unit of all computers is comprised of the following two types of storage :

primary storage

→ The primary storage, also known as main memory, is used to hold pieces of program, instructions and data, intermediate results of processing and recently produced results of processing.

→ However, the primary storage can hold information only while the computer system is on.

→ When the computer is switched off, the information held in the primary storage disappears.

secondary storage

→ It is used to supplement the limited storage capacity and the volatile characteristic of primary storage.

→ secondary storage is much cheaper than primary storage and it can retain information even when computer system is switched off.

→ The most commonly used storage medium is the magnetic disk.

Q. 4 Convert the followings :

Q.4

(i) $(346.73)_8 = (?)_2$

$346.73 = (011\ 100\ 110 . 111\ 011)_2$

(ii) $(1100111101.01011101)_2 = (?)_8$

001 100 111 101 . 010 111 010

$= (1475.272)_8$

(iii) $(100110101)_2 = (?)_8$

100 110 101 = $(465)_8$

(iv) $(623)_8 = (?)_2$

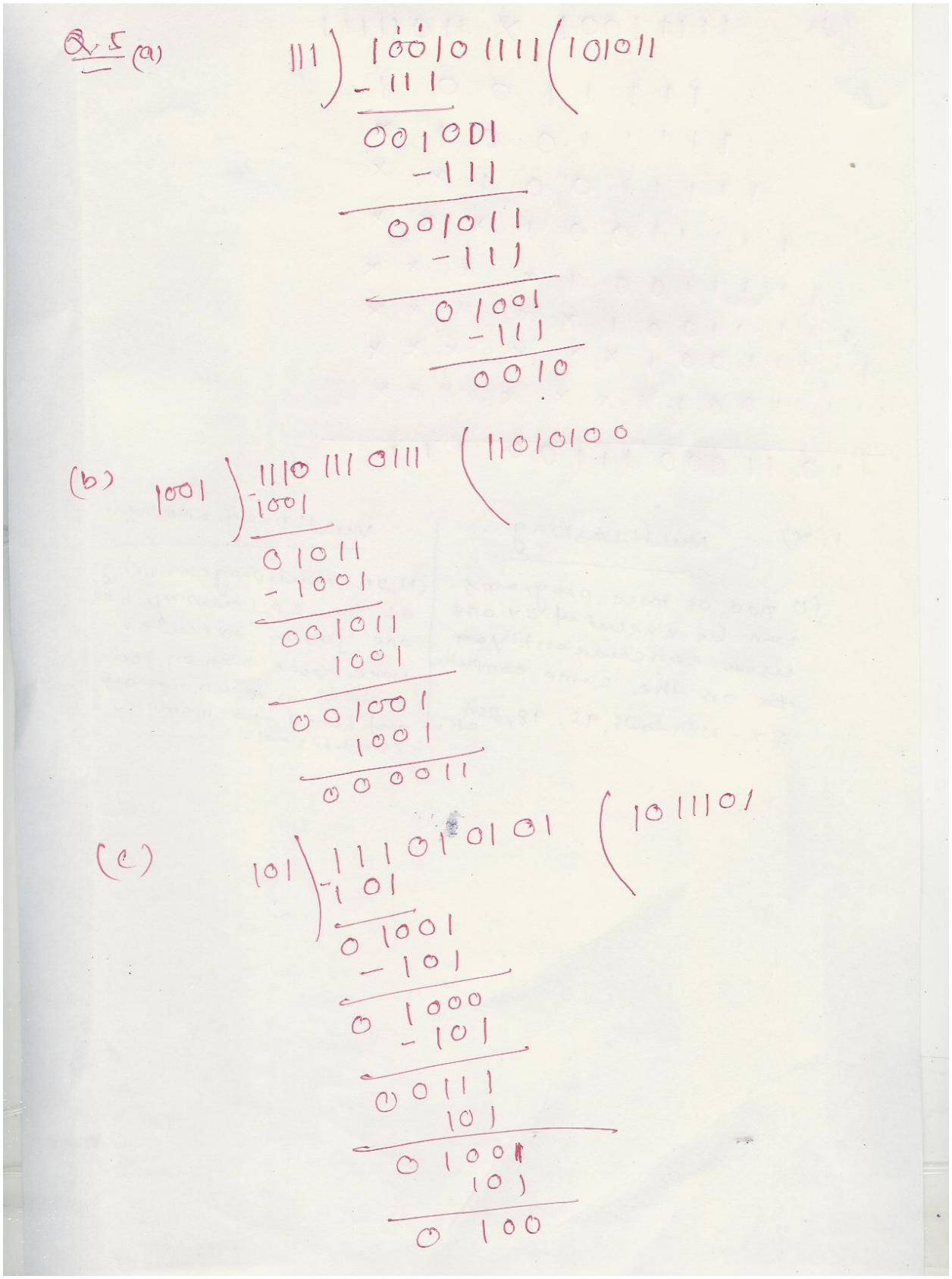
6 = 110

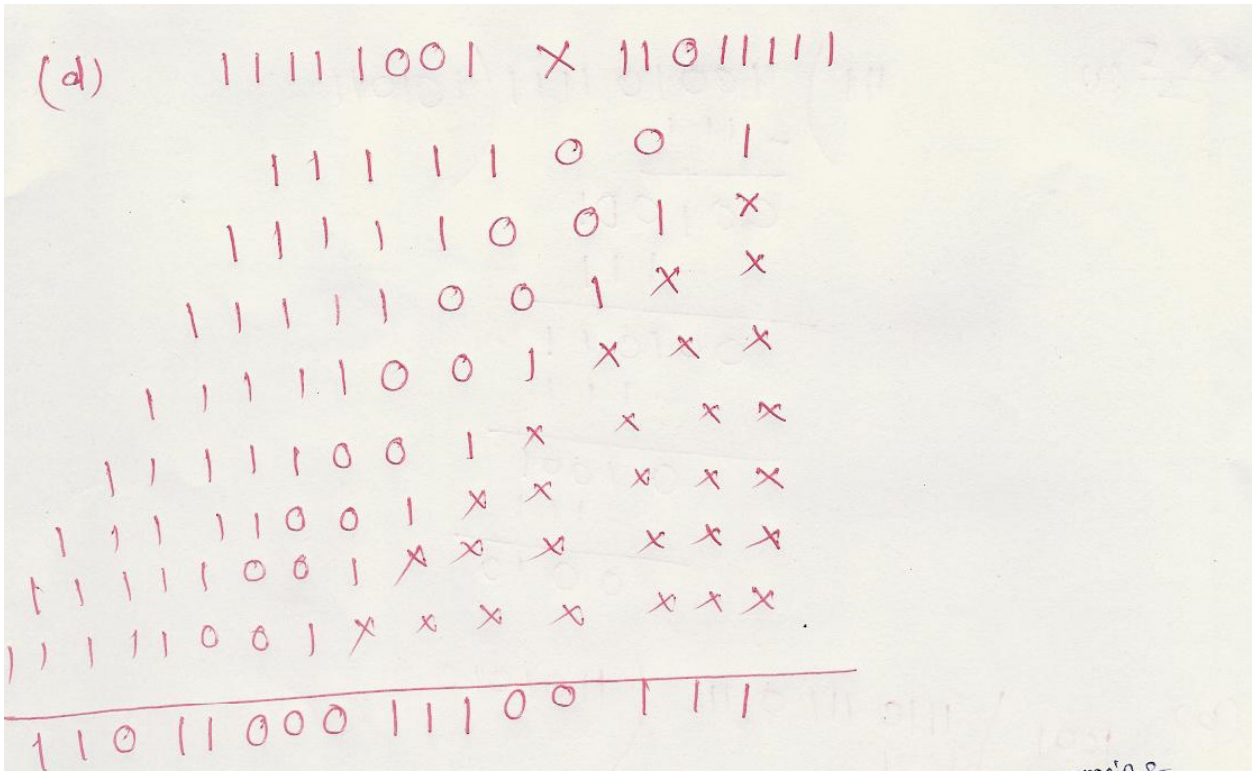
2 = 010

3 = 011

$(623)_8 = (110\ 010\ 011)_2$

Q. 5 Solve the followings :




(d) 11111001 × 11011111
11111001
11111001 ×
11111001 × ×
11111001 × × ×
11111001 × × × ×
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11111001 × × × × × × ×
1101100011100111

Q. 6 Describe the different types of codes available for representation of characters.

Representations of characters

(10)

BCD code

The binary coded decimal (BCD) code is one of the early memory codes.

It is based on the idea of converting each digit of a decimal number into its binary equivalent rather than converting the entire decimal value into a pure binary form.

In the BCD form ~~that~~ ~~each~~ to represent characters 6 bits are used.

In the 6-bit code the four BCD numeric place position are retained (1, 2, 4 and 8)

Two additional zone positions are used in combination with the numeric bits to represent alphabetic and special positions are used in combination with the numeric bits to represent alphabetic and special characters.

When only 6 bits are used a total of 64 different characters can be represented.

These are sufficient to code 10 decimal digits, 26 alphabets and other 28 special characters.

EBCDIC

This coding scheme is called Extended binary Coded decimal interchange code.

In this code it is possible to represent $2^8 = 256$ different characters. EBCDIC is an 8-bit codes it can be easily divided into two 4-bit groups.

Each of these 4-bit groups can be represented by 1 hexadecimal digit.

ASCII

It stands for American standard code for information interchange. ASCII is of two types → ASCII-7 and ASCII-8.

ASCII-7 is a 7bit code that allows $2^7 = 128$ different characters. The first 3bits are used as zone bits and the last 4 bits indicate the digit.

ASCII-8 is an extended version of ASCII-7. It is an 8-bit code that allows $2^8 = 256$ different characters rather than 128.

Q.7 What are the different types of computer languages available? Explain each of them.

Machine Language.

A language that is directly understood by the computer without any translation is called machine language. # machine language is a string of binary 0s and 1s.

Advantages

→ Execution speed is very fast.
→ efficient use of primary memory.
→ It does not require any translation.

Disadvantages

Machine dependent: The machine language is different for different types of computer. Machine language is determined by the design of ALU, CU, size and word length of the memory unit of the computer.

Difficult to write program

It is very difficult to write a program in machine language because it requires memorizing dozens of codes for the different commands.

Error prone

To write a program, the programmer must remember operation codes and he has to keep a track of the storage locations of data and instructions. This causes error in programming.

Difficult to modify → It is very difficult to modify the machine language programs because locating the errors is very difficult.

High - level language

In high - level language the programmer should concentrate mainly on logical analysis of the problem rather than hw structure. High level languages are generally problem oriented and machine independent. It does not use mnemonic codes.

Ex - cobol, C, pascal, fortran, etc.

Advantages

→ The programs are easy to read and learn than machine or assembly language.
→ Machine independent.
→ Easier to maintain.
→ Insertion, deletion and modification in the HLL program are easy.
→ Fewer errors and easy debugging.
→ In HLL programs, syntax and logical errors are easy to detect and remove.
→ Lower program preparation cost.

Disadvantages

Speed High - level language programs takes more time to run as compared to machine or assembly languages.

Memory High level language programs require more main memory than machine or assembly language programs.

Lack of flexibility → some tasks cannot be performed on high level language and if done then it is very difficult to design a program for these tasks.

Assembly language

An assembly language is a low-level language program. Assembly languages use mnemonics in place of machine codes to represent operating codes.

Halt, add, subtract etc. operation can be represented as HLT, ADD, SUB in assembly languages. These are called mnemonics.

Advantages

→ Easier to memorize and use.
→ Easy to write input data.
→ Easy print out.
→ Better detect the errors.
→ Good library facility.

Disadvantages

→ Machine dependent
→ Knowledge of hardware is required
→ Time consuming.

Q.8 Write short notes on : (any two)

(i) Translator

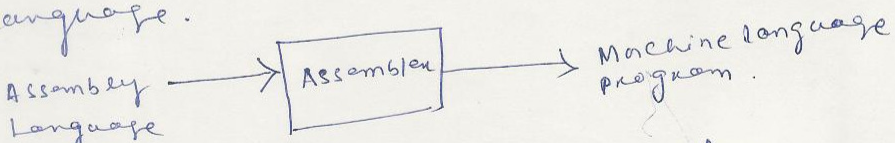
(18)

Translator

Translator is a system software used to perform translation of high-level language to low level language. All programming languages consider as high-level language i.e. C, C++.

Input to a translator is source language and output is target language. There are three types of translator:-

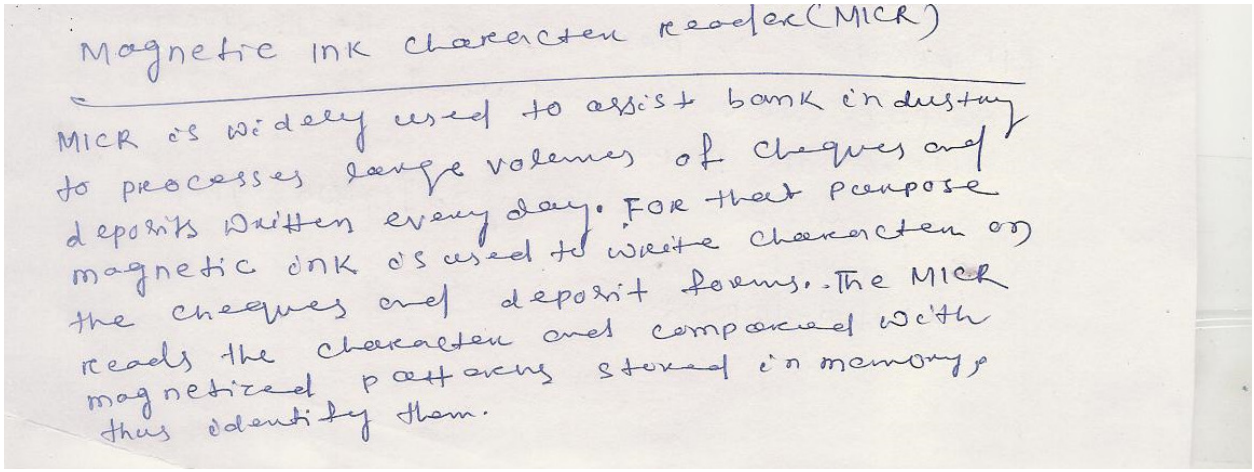
(1) Assembler : An assembler accepts assembly language as source language and produce machine language. It is required because computer can understand only machine language.



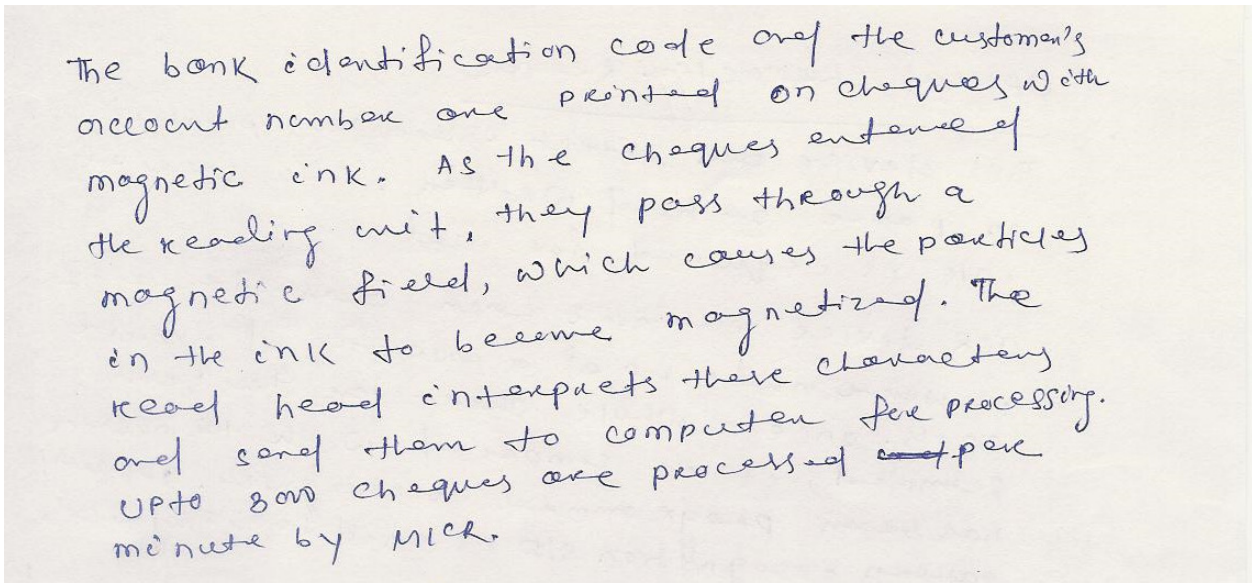
(2) Interpreter : It is also used for converting the program into code of high level language it checks the errors of program statement by statement. After checking the one statement it converts that statement into machine code and then executes that statement.

(3) Compiler : A compiler is a translator that translates the high-level language program into machine language. Compiler translates whole program at once and produce errors.

(ii) Magnetic Ink character reader


Magnetic ink character reader (MICR)

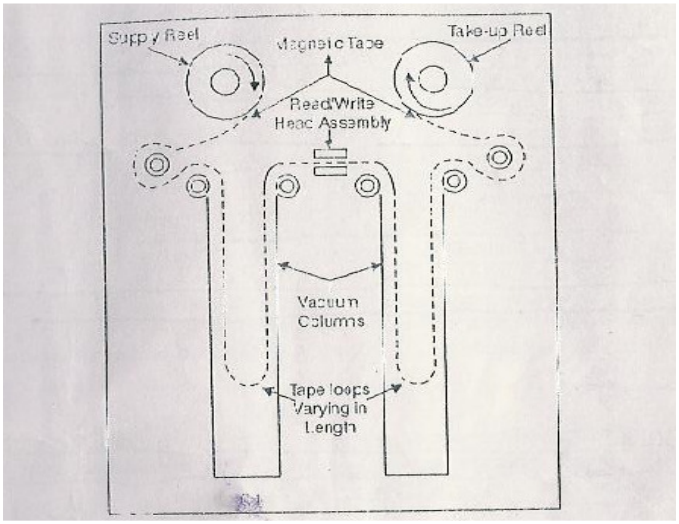
MICR is widely used to assist bank industry to processes large volumes of cheques and deposits written every day. For that purpose magnetic ink is used to write characters on the cheques and deposit forms. The MICR reads the characters and compared with magnetized patterns stored in memory, thus identify them.


The bank identification code and the customer's account number are printed on cheques with magnetic ink. As the cheques entered the reading unit, they pass through a magnetic field, which causes the particles in the ink to become magnetized. The read head interprets these characters and send them to computer for processing. Upto 800 cheques are processed per minute by MICR.

(iii) Magnetic tape

Magnetic tape is one of the most popular sequentially access storage mediums for large data. Magnetic tape was the first magnetic mass storage devices. The tape is plastic ribbon usually ½ inch or ¼ inch wide and 50 to 2400 feet long. Tape is coated on one side with an iron oxide material, which can be magnetized and it is mounted on a reel for easy handling. Magnetic tapes are reusable. Old data is automatically erased when new data are recorded in the same area. The tape is divided into vertical columns called frames and horizontal rows called channels or tracks. Information is recorded on the tape in the form of tiny invisible magnetized and non-magnetized spots on the iron oxide side of the tape. A character is recorded per frame using one of the computer codes. Older tapes had 7 tracks and they used the 6-bit BCD code for data recording. Most of the modern magnetic tapes have 9 tracks and they use 8-bit EBCDIC code for recording data.

Magnetic tape drive is a machine that can either read data from a tape into the CPU or it can write information onto the tape. The tape drive allows two reels to be mounted on it.
One acts as supply reel and other as the take up reel. During processing the tape from a supply reel to a take-up reel via two vacuum channels and through a read/write head assembly. The read/write head assembly is a single unit having one read/write head for each tape track. They either read information or write information on the tape. The two vacuum channels are designed to take up slack tape, acting as buffers to prevent the tape from stretching when starting from a stationary position or slowing down with full speed.



Magnetic Tape Drive

(iv) Laser Printer

Laser printer

These printers contain a drum with photo-sensitive surface. The laser beams or some other light sources are used to produce the image on a photosensitive drum. The image on the drum can be transferred onto the paper. The paper is passed through a heat chamber and that fuses the toner particles so the characters or images are formed permanently on the paper. After this process drum is discharged and cleaned. This process is done for one page after this the drum is ready for printing the next page.