Introduction To Computers And Programming In C
[ES 202]
Assignment-1

Q1.) Convert the following:

i.) $(478A.BC)_{16} = (\ )_{10}$

$= 4\times16^3 + 7\times16^2 + 8\times16^1 + 10\times16^0 + 11\times16^{-1} + 12\times16^{-2}$

$= (18314.734)_{10}$ Ans

ii.) $(975.55)_{10} = (\ )_2$

$=$

2	975	1
2	487	1
2	243	1
2	121	1
2	60	0
2	30	0
2	15	1
2	7	1
2	3	1
	1	

$0.55\times2 = 1.1$
$0.1\times2 = 0.2$
$0.2\times2 = 0.4$
$0.4\times2 = 0.8$
$0.8\times2 = 1.6$

$\Rightarrow (1111001111.10001)_2$ Ans

iii.) $(11001100.10)_2 = (\ )_{16}$

$=$ 1100 (C) 1100 (C) . 1000 (8)

$\Rightarrow (CC.8)_{16}$ Ans

iv.) $(15.235)_{10} = (\ )_8$

$=$

8	15	7
	1	

$8\times0.235 = 1.88$
$8\times0.88 = 7.04$
$8\times0.04 = 0.32$
$8\times0.32 = 2.56$

$\Rightarrow (17.1702)_8$ Ans

v.) $(251)_{10} = (\ )_2 = (\ )_8 = (\ )_{16}$

2	251	1
2	125	1
2	62	0
2	31	1
2	15	1
2	7	1
2	3	1
	1	

$\Rightarrow (11111011)_2$ Ans

8	251	3
8	31	7
	3	

$\Rightarrow (373)_8$ Ans

16	251	B
	15	

$\Rightarrow (15B)_{16}$ Ans
$\hookrightarrow (FB)_{16}$

vi.) $(141)_{10} = (\ )_2 = (\ )_8 = (\ )_{16}$

2	141	1
2	70	0
2	35	1
2	17	1
2	8	0
2	4	0
2	2	0
	1	

$\Rightarrow (10001101)_2$ Ans

8	141	5
8	17	1
	2	

$\Rightarrow (215)_8$ Ans

16	141	D
	8	

$\Rightarrow (8D)_{16}$ Ans

viii.) $(0110101111010011 00)_2 = (\ )_{10} = (\ )_8 = (\ )_{16}$

$= 2^0\times0 + 2^1\times0 + 2^2\times1 + 2^3\times1 + 2^4\times0 + 2^5\times0$
$+ 2^6\times1 + 2^7\times0 + 2^8\times1 + 2^9\times1 + 2^{10}\times1 + 2^{11}\times1$
$+ 2^{12}\times0 + 2^{13}\times1 + 2^{14}\times0 + 2^{15}\times1 + 2^{16}\times1$
$+ 2^{17}\times0$

$= (110412)_{10}$

8	110412	4
8	13801	1
8	1725	5
8	215	7
8	26	2
	3	

$\Rightarrow (327514)_8$

$\Rightarrow (1AF4C)_{16}$

viii.) $(235.4)_8 = (\ )_{16}$

$= (010\,011101.100)_2$

$= (9D.8)_{16}$

ix.) $(5214)_{10} = (\ )_{16}$

16	5214	E
16	325	5
16	20	4
	1	

$= (145E)_{16}$

x.) $(1011)_{10} = (\ )_2$

2	1011	1
2	505	1
2	252	0
2	126	0
2	63	1
2	31	1
2	15	1
2	7	1
2	3	1
	1	

$= (1111110011)_2$

xi.) $(5A8)_{16} = (\ )_8$

$= (10\,1101\,01000)_2$

$= (2650)_8$

xii.) $(5214.254)_{10} = (\ )_{16}$

$=$

16	5214	E
16	325	5
16	20	4
	1	

$16 \times 0.254 = 4.064$
$16 \times 0.064 = 1.024$
$16 \times 0.024 = 0.384$
$16 \times 0.384 = 6.144$

$\Rightarrow (145E.4106)_{16}$

xiii.) $(1011)_{Grey} = (\ )_{Binary}$

$= 1\ 0\ 1\ 1$

$= (1\ 1\ 0\ 1)_{binary}$

xiv.) $(7F2.97)_{16} = (\ )_8$

$= (11111110010.10010111)_2$

$= (3762.456)_8$

xv.) $(13)_{10} = (\ )_{BCD}$

2	13	1
2	6	0
2	3	1
	1	

$= (1101)_{BCD}$

xvi) $(24.25)_{10} = (\ )_2 = (\ )_{16}$

$= \begin{array}{r|l|l} 2 & 24 & 0 \\ \hline 2 & 12 & 0 \\ \hline 2 & 6 & 0 \\ \hline 2 & 3 & 1 \\ \hline & 1 & \end{array}$

$2 \times 0.25 = 0.5$
$2 \times 0.5 = 1.00$

$\Rightarrow (11000.01)_2$

$= (18.4)_{16}$

xvii) $(133.15)_{10} = (\ )_2 = (\ )_{16}$

$\Rightarrow \begin{array}{r|l|l} 2 & 133 & 1 \\ \hline 2 & 66 & 0 \\ \hline 2 & 33 & 1 \\ \hline 2 & 16 & 0 \\ \hline 2 & 8 & 0 \\ \hline 2 & 4 & 0 \\ \hline 2 & 2 & 0 \\ \hline & 1 & \end{array}$

$0.15 \times 2 = 0.30$
$0.30 \times 2 = 0.60$
$0.60 \times 2 = 1.20$
$0.20 \times 2 = 0.40$

$\Rightarrow (10000101.0010)_2$

$= (85.2)_{16}$

xix) $(752)_8 = (\ )_{16}$

$= (111101010)_2$

$= (1EA)_{16}$

xx) $(678)_{10} = (\ )_8$

$= \begin{array}{r|l|l} 8 & 678 & 6 \\ \hline 8 & 84 & 4 \\ \hline 8 & 10 & 2 \\ \hline & 1 & \end{array}$

$= (246)_8$

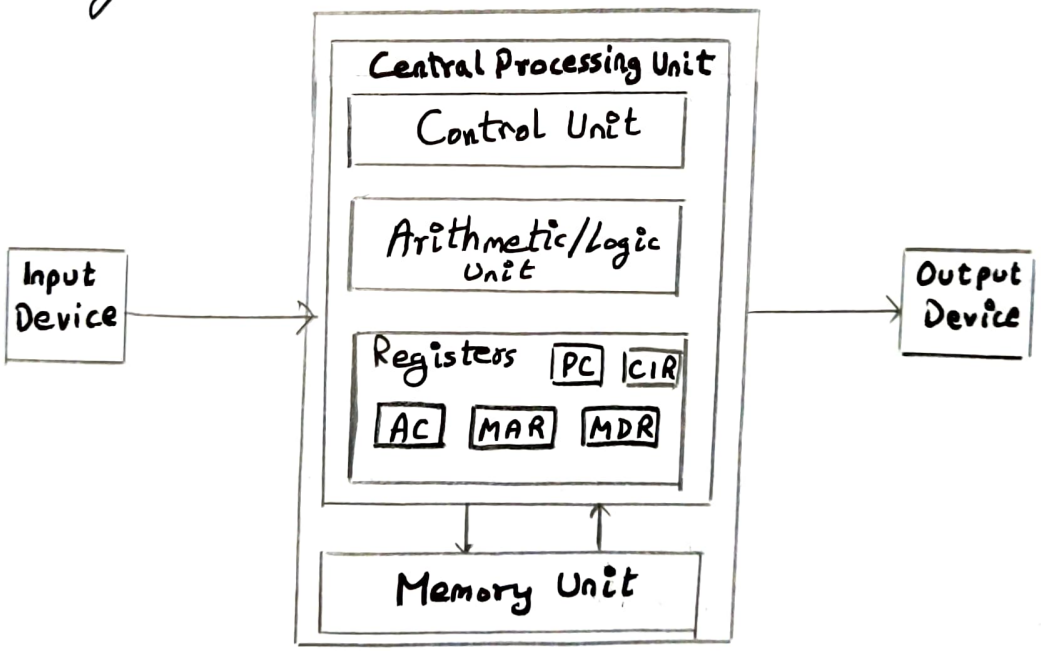
Q2) What are the peripherals? Explain the different type of printers.

Ans 2) A peripheral or peripheral device is an ancillary device used to put information into and get information out of the computer. For instance, a keyboard and mouse are input peripherals while a monitor and printer are output peripherals.
The different types of printers are:

- Laser Printers
The laser printer was developed by Xerox in the 1960s when the idea of using a laser to draw images onto a copier drum was first considered. They are more efficient than inkjet printers.
- Solid Ink Printers
Solid Ink printers utilise a unique form of ink technology, designed to save space and money on packaging. The printers melt solid ink sticks during the printing process – a method which can help produce more vibrant tones.

- **LED Printers**
  LED printers are similar to laser printers but use a light emitting diode rather than a laser to create images on the print drum or belt. Due to their fewer moving parts – LED printers are often considered more efficient and reliable than laser printers.
- **Inkjet Printers**
  Inkjet printers are most commonly used printers, they recreate a digital image by propelling droplets of ink onto paper and plastic substrates.
- **Dot Matrix Printers**
  Dot matrix printers are the oldest established type of printers still available on the market. Images and texts are drawn out in tiny dots when a print head strikes an ink-soaked cloth against the paper in the required pattern or formation.
- **3-D Printers**
  One of the most exciting developments in printing technology history, 3-D printing is becoming more affordable for professional and domestic users. Modern 3-D printers are capable of producing 3-D objects and items using high quality resin.

Q3) Draw the block diagram of a digital computer. Explain the function of each block in detail.



CPU → The Central Processing Unit (CPU) is the electronic circuit responsible for executing instructions of a computer program. It is sometimes referred to as the microprocessor or processor. The CPU contains the ALU and CU and a variety of registers.

Registers → Registers are high speed storage areas in the CPU. All data must be added/stored in a register before it can be processed.

(MAR) Memory Address Register → Holds the memory location of data that needs to be access

(MDR) Memory Data Register → Holds data that is being transferred to or from memory.

(AC) Accumulator → Where intermediate arithmetic and logic results.

(PC) Program Counter → Contains the address of the next instruction to be executed.
(CIR) Current Instruction Register → Contains the current instruction during process.

Arithmetic and Logic Unit (ALU)
The ALU allows arithmetic (add, subtract, etc.) and logic (AND, OR, NOT etc.) operations to be carried out.

Control Unit (CU)
The control unit controls the operation of the computer's ALU, memory and input/output devices, telling them how to respond to the program instructions it has just read and interpreted from the memory unit. It also provides the timing and control signals required by other computer components.

Memory Unit
The memory unit consists of RAM, sometimes referred to as primary or main memory. Unlike a hard drive (secondary memory), this memory is fast and also directly accessible by the CPU.
RAM is split into partitions. Each partition consists of an address and its contents (both in binary form).
The address will uniquely identify every location in the memory.

Q4.) Differentiate in between Assembly language, High level language and Machine language.

Assembly Language	High level Language	Machine Language
• Understood only by humans.	Understood by humans especially programmers.	Understood by computers only.
• Data represented in form of mnemonics such as Mov, add etc.	Less memory consumption and easy to understand.	Data represented only in binary, decimal or hexadecimal.
• Error fixing can be done	Simple to debug and maintain.	Error fixing cannot be done.
• Slow execution with a need of a translator.	Compiler and interpreter are needed.	Execution is fast and no need of any translator.
• Machine dependent.	It is portable.	Hardware dependent.

Q5.) What is the difference between multi-tasking and time sharing system? Explain.

Ans 5) Multi Tasking: is the method where multiple tasks (processes) are performed during the same time.

Time sharing: on the other hand is described as being the sharing of computing resource among many users by means of multiprogramming and multi tasking. So in effect by allowing many users to interact concurrently with a sigle computer.

Q6) Differentiate between optical storage and magnetic storage. Also explain the significance of the term track and sector in these media.

Optical Storage	Magnetic Storage
• It has single removable disk.	It has multiple fixed disks.
• Excellent signal to noise ratio.	Intermediate signal to noise ratio.
• Tracks are spiral or circular.	Tracks are circular.
• Has high speed sample rate.	Has low sample rate.
• Used when streaming files.	Used when data is randomly accessed.

Track: The area on a disk platter which can be accessed without the moving of the access arm.

Sector: A fixed size physical data block on a disk drive. A track usually contains a large amount of information which is divided into smaller sectors.

Q7) What is Operating System? Explain its responsibilities? Give few names of Operating Systems?

Ans 7) An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux Operating System, Windows Operating System, VMS, OS/400, AIX, z/OS, MacOS, etc.

Q8) Differentiate between compiler and interpreter.

Compiler	Interpreter
• Compiler scans the whole program at one go.	Interpreter reads the program statement by statement.
• Faster execution time.	Slower execution time, thus less preferred.
• Errors are shown at the end.	Errors are shown at the same instance line by line.
• It converts the instructions into a lower level language (e.g. assembly language, object code or machine code).	It converts the high level language to machine level language.
Eg: C, C++, Java compiler.	Eg: Python, Ruby, Perl Interpreter, etc.