Assignment -1

Section - A

1. What is Computer ?
A computer is an electronic device capable of performing calculations and processing data rapidly and accurately. It accept data as input, process it according to instructions and produces information as output.

2. Write five characteristic of Computer.
Five characteristic of computer are :-
1. Speed : It can perform millions of calculations per sec.
2. Accuracy: Computer process data with high precision, minimizing errors
3. Storage : Large amount of data can be stored and retrieved quickly.
4. Diligence : Unlike hum humans computer do not suffer from fatigue and work continously
5. Versatility : Capable of performing wide range of task.

3. What is Cyclic code ?
A cyclic code is a type of error connecting code used in digital communication systems. It called Cyclic because the code structure is based on cycle or ring. The difining feature of a cyclic code is that if a sequence (or codeward) is part of the code, then any cyclic shift of that code sequence is also part of the code.

4. What is mean impact printer ?

24BCON12699
PAGE NO.:
DATE: / /

A non impact printer is a type of printer that doesn't physically strike an ink ribbon or paper to produce printed characters. Instead it uses other technologies to create image on the paper.
Ex → Inkjet printing, laser printing, thermal printing electrostatic printing.

5. find 2's complement of 0011100?
2' complement = 1's complement + 1
1st complement = 1100011

2' complement = 1100011
+ 1
1100100

Section - B

6. What is memory hierachy? Explain working of central unit by a suitable diagram
Memory hierachy refers to the organization of computer memory into a hierarchial structure with each level having a different access speed, capacity and cost. The hierarchy is designed to optimize performance, cost & power consuption.
Typical levels of memory hierarchy are :-
1. Registers (fastest, smallest)
2. Cache memory (Fast, small)
3. Main memory (medium speed, medium size)
4. Secondary storage (slowest, largest)

PAGE NO.:
DATE: / /

Central unit (CU) — CU is a component of the central processing unit (CPU) that manages the flow of data and instruction between different parts of computer.

Here's a simplified diagrame of CU :

Instruction register (IR) → Decoder

Registers (e.g. PC, SP) ← Central signals eg read, write

ALU (Arithmetic logic unit) → memory (main memory)

CU work as follow

1. Instruction Fetch : CU fetches an instruction from memory and stores it in IR.
2. Decoding : CU decodes the instruction, determining the operation to be performed.
3. Control signals : CU generation control (e.g. read, write) to manage data transfer between register, ALU and memory
4. Register management : CU manages the registers, including the programme counter (PC) & stack pointer (SP)
5. ALU operation : CU performs arithmetic and logical operations using the ALU
6. Memory access : CU access main memory for data transfer.

7. Convert following into binary.

(a) $(AF9)_{16} = (\ ?\ )_2$

For conversion of hexadecimal into first convert hexadecimal to

4

to decimal and decimal to binary.
We know that in hexadecimal A = 10
F = 15

Hexadecimal to decimal

$(10159)_{16} = 10\times16^2 + 15\times16^1 + 9\times16^0$
$= 10\times256 + 240 + 9$
$= 2560 + 240 + 9 = (2809)_{10}$

Now $(2809)_{10}$ to binary

2	2809	1
2	1404	0
2	702	0
2	351	1
2	175	1
2	87	1
2	43	1
2	21	1
2	10	0
2	5	1
2	2	0
	1	

$= 101011111001$

$(AF9)_{16} = (101011111001)_2$

(b). $(701)_8 = (?)_2$

For octal to binary first change octal to decimal and decimal to binary

Octal to decimal

$(701)_8 = 7\times8^2 + 0\times8^1 + 1\times8^0$
$= 7\times64 + 0 + 1$
$= 448 + 1 = (449)_{10}$

24BCON2699
PAGE NO.:
DATE: / /

Now convert $(449)_{10}$ into binary

2	449	1
2	224	0
2	112	0
2	56	0
2	28	0
2	14	0
2	7	1
2	3	1
	1	

$= (111000001)_2$

$= (701)_8 = (111000001)_2$

(c) $(10111.100)_2 = (?)_{10}$

$= 1\times2^5 + 0\times2^4 + 1\times2^3 + 1\times2^2 + 1\times2^1 + 1\times2^0 + 1\times2^{-1} + 0\times2^{-2} + 0\times2^{-3}$
$= 32 + 8 + 4 + 2 + 1 + 0.5$
$= (47.5)_{10}$

8. (a) Explain BCD code with example.

BCD (Binary Coded decimal) is a way to represent decimal number using binary code. In BCD each digit of a decimal number is represented by a 4-digit binary code.

Ex → decimal number = 456

BCD representation

4 = 0100
5 = 0101
6 = 0110

So, BCD representation 010001010110

24BCON2699

PAGE NO.:

DATE: / /

6

(b) Explain primary and secondary memory with with suitable example.

Primary memory (main memory)

It is the computer's primary working memory where data and instructions are stored temporarily. For immediate access by CPU.

Characteristic

- Volatile - Data is when power is turned off.
- Faster access compared to secondary memory.
- Smaller capacity compared to secondary memory.
- More expensive than secondary memory.

Types - RAM, ROM, cache memory

Example - Imagine you are working on a word document on your computer. When you open the document, it gets loaded from hard drive (secondary storage) into the primary memory (RAM). While you work on the document those changes are temporarily stored in RAM. However, once you close document and shut down the computer without saving it, the data is RAM is lost because RAM is volatile memory.

Secondary memory (Auxiliary memory)

It is used for permanent storage of data and programs

Characteristic

Non volatile - Data persists even when power is off

Slow access compared to primary memory.

Larger capacity compared to main memory.

Less expensive than main memory

PAGE NO.:
DATE: / /

Types - magnetic storage, optical storage, solid-state storage

Example : Consider process of sharing and accessing photos on your computer
1. Saving photos
2. Accessing photos
3. Archiving

Section - C

9. (a) Explain ASCII and EBCDIC code.
ASCII (American standard code for information interchange) & EBCDIC (Extended Binary Coded decimal interchange code) are two character encoding standard used to represent text and other character in computer.

ASCII
Developed in 1963
used 7 Bit memory code (0-127)
Represents
Upper case & lower case letter (A-z, a-z)
Digit (0-9)
Punctuation marks (!, @, #, etc)
Control characters (tab, newline etc)
Example - letter A is represented as 01 000001

EBCDIC
Developed in 1963 (same year as ASCII)
uses 8 bit binary code (0-255)
Primarily used on mainframe computer (IBM)

24BCON12699

PAGE NO.:

DATE: / /

8

Represents:
uppercase & lowercase letters (A-z, a-z)
Digit (0-9)
Punctuation marks (!, @, #, etc.)
Control Character (tab, newline etc)
Additional Character (currently, graphics etc)
Ex → letter A is represented as 1100001

Both ASCII and EBCDIC are still used today, but ASCII become the defacto standard representation in most computer system.

Performing matrics of a computer refer to the qualifiable measures used to evaluate its performance, efficiency & effectiveness. Here are the key performing matrics.

1. Processing speed (clock speed - measured in GHz, it represents the no. of instruction executed per second.
2. CPU utilization - Percentage of time the CPU processing task ideally between 40% and 80%.
3. - The no. of tasks completed per unit time, measured in instruction per second (IPS) or transcation per second (TPS)
4. Response time - Time taken for the system to respond to user input or request, aiming for minimal latency.
5. Memory Usage - The amount of RAM used aiming for sufficient free memory to avoid swapping or thrashing.
6. Storage performance - • Read/write speed - measurement in MB/s or GB/s
   • Access time - time taken to access data on storage device

DATE: / /

7. Network performance -
   - Bandwidth - Data transfer rate, mb/s or Gb/s.
   - Latency - Time taken for data to travel across the network

8. Power consuption - measured in watts (w), aiming for energy efficiency.

10. (a) Explain generation and types of computers

Generation of computer

1. First generation (1940 - 1956)
   Hardware - vaccum tube
   Characteristic - large, bulky & consumed a lot of power generated a lot of heat slow speed and unreliable used machine language for programming.

2. Second Generation (1956 - 1963)
   Hardware - Transistors
   Characteristic - smaller, faster and more reliable than vaccum tube, less heat generation, introduced assembly language batch operating system

3. Third Generation (1964 - 1971)
   Hardware - Integrated circuits (ICs)
   Characteristic - smaller, faster, cheaper than transistor introduction of high level programming language operating system developed time sharing system.

4. Fourth Generation (1971 - present)
   Hardware - microprocessor

PAGE NO.:
DATE: / /

Characteristics – Microprocessor led to development of PCs mart improvement in speed, size, cost, user friendly interfaces networking & internet.

5. Fifth Generation (Present & Beyond)
Hardware – AI
Characteristics – Focus on development of computer that can think and reason. Natural language processing. Robotics. Expert systems & still under development

Types of Computer

1. Analog Computer: Process continious data
2. Digital Computer: Process discrete data
3. Hybrid computer: Combine digital & log processing
4. Mainframe computer: Large, powerful system for interprise use
5. Mini computer: smaller, multiuser systems
6. Micro computer: PCs, laptops & mobile device
7. Super computer: High performance system for scientific stimulation and modeling.

(b) Convert following binary into decimal cod

(i) $(1111)_2 = 1\times2^3 + 1\times2^2 + 1\times2^1 + 1\times2^0 = (15)_{10}$

(ii) $(1010)_2 = 1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0 = (10)_{10}$

(iii) $(11100001010)_2 = 1\times2^{10} + 1\times2^9 + 1\times2^8 + 0\times2^7 + 0\times2^6 + 0\times2^5 + 0\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0$

$= 2 + 8 + 256 + 512 + 1024$

$= (1802)_{10}$

$(11100001010)_2 = (1802)_{10}$

24BCON2...
PAGE NO.:
DATE: / /

11. (a) Explain input & output devices of computer with example?
Input/Output devices are the communication channels between and the outside world. They enable users to interact with the computer and provide a way for the computer to present information.

Input devices: device that allow data and instruction to be entered into a computer
Example
Keyboard - for typing text
Mouse - For controlling the cursor & selecting options
Scanner - For converting printed document into digital images
Microphone - For capturing audio input
Webcam - For capturing video input
Joystick - For controlling games or other application

Output devices: devices that display or process the processed data and information from the computer
Example
Monitor - visual display of information
Printer - Produces hard copies of document
Speakers - output audio
Projector - Display images on a large screen
Plotter - Produces high quality graphics

(b) Evaluate - (i) $10000001 - 1111 = (?)_2$

$$\begin{array}{r} 10000001 \\ - \quad 1111 \\ \hline 01110010 \end{array}$$

(ii) $101010 \times 11 = (?)_2$

$$
\begin{array}{r}
10101010 \\
\times \quad\quad 11 \\
\hline
10101010 \\
10101010\times \\
\hline
1111111110
\end{array}
$$

(iii) $10100010 + 101 = (?)_2$

$$
\begin{array}{r}
10100010 \\
+ \quad\quad 101 \\
\hline
10100111
\end{array}
$$