

IAT-1 Solution/Model Answer

CPPS – 18CPS23

2nd Sem CSE – 2021

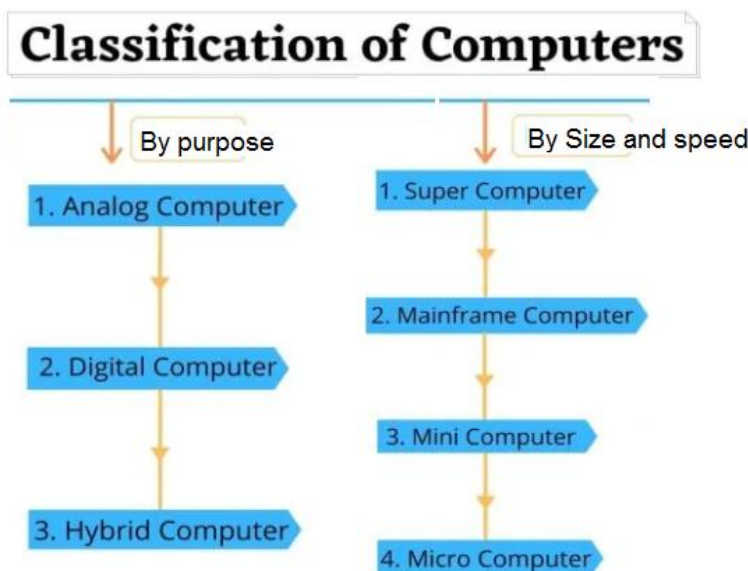
Dr. P. N. Singh, Professor(CSE)

1. Describe the various type of computer (according to purpose and according to size and speed)

Ans:

According to purpose: Analog, Digital, Hybrid

- Analog computers are mainly used to measure physical units like the voltage, pressure, electric current, temperature, and convert them into digits. Eg. Thermometer
- Digital Computer represents and calculates the digital letters, numerical values, or any other special symbols for processing the data. Example : PCs
- Hybrid Computer is a combined complex computer of both the properties of analog and digital and united by a single control system. Example: Super computer



According to size and speed:

Super, Main Frame, Mini, Micro(PC-Desktop, Laptop, Palmtop, Note book, Tablet, Pocket-smart Phone)

- A Supercomputer is the very **fastest** and **powerful**, and **expensive** type of computer for processing data. A super computer is multi-specific task Example: CRAY
- Mainframe computers are **multi-programming**, **high-performance** computers, and multi-user, which means it can handle the workload of more than 100 users at a time on the computer. Ex. IBM Ex Series
- Minicomputer is a **digital and multi-user** computer system with the connection of more than one CPU. Thus, many people can work on these computers simultaneously instead of a single person. Also, it can process with other accessories like a printer, plotter, etc. these computers are currently used to *store large databases, multi-user applications, and the automation industry*. Example: PDP 11 and IBM 8000 series
- Today we are using many computers at home is also the most common microcomputer. With this invention of the microprocessors in the year 1970, it became possible to use computers for people personally at a low cost and reasonable price known as Digital **Personal Computer**. Examples: Lenovo, Del, HCL Again this led to Notebook, tablets and smart phones.

2.

a) **Define the terms Network, LAN, WAN & MAN.**

b) **Differentiate between Primary Memory and Secondary Memory**

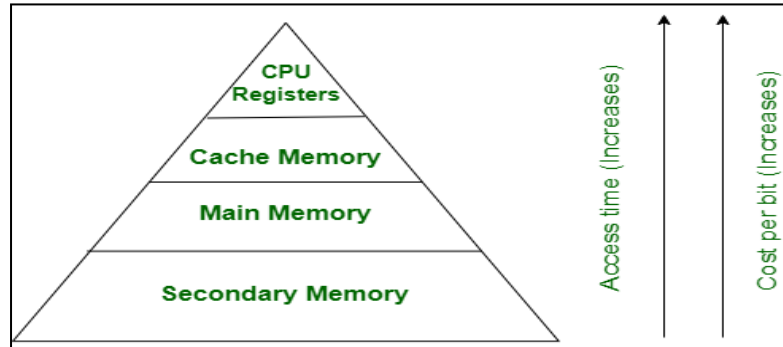
Ans:

a)

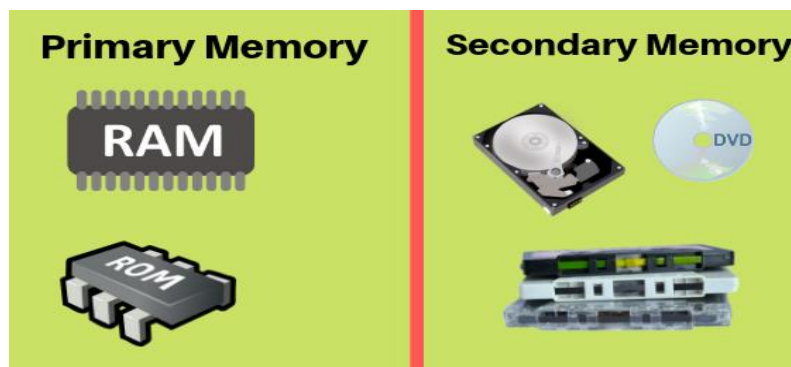
- **Computer Network:** Network: Collection of devices/computers connected together is called a Network. Computer network is a set of computers connected together for the purpose of sharing resources. The most common resource shared today is connection to the Internet. Other shared resources can include a **printer** or a file **server**. The Internet itself can be considered a computer network.
- LAN(Local Area Network): A group of computers & devices connected together, usually within the same building or in same campus is LAN.
- MAN(Metropolitan Area Network): MAN is a larger network that usually spans several buildings in the same city or town. The Dish TV network is an example of a MAN.
- WAN(Wide Area Network): A **WAN** (wide area network), in comparison to a MAN, is not restricted to a geographical location, although it might be confined within the bounds of a state or country. A WAN connects several LANs, and may be limited to an enterprise (a corporation or an organization) or accessible to the public. The technology is high speed and relatively expensive.

b. Primary and secondary memory

- **Primary memory** is also called **internal memory** whereas **Secondary memory** is also known as a **Backup memory** or **Auxiliary memory**.
- **Primary memory** data is directly accessed by the processing unit whereas **Secondary memory** data cannot be accessed directly by the processor



Examples:



- The storage unit is Primary Memory (RAM) & Secondary (permanent storage devices: disks, tapes)
- RAM(Random Access Memory): RAM is the memory - primary storage where our data & programs are stored temporarily. It is volatile in nature. After switching off the system everything will be vanished from RAM.
- ROM(Read Only Memory): ROM is storage medium/"firmware" where some code of manufacturer is permanently hardwired in chip which always executes automatically when we start the system. The process is known as POST(Power on Self test). Booting precedes POST.

3. Solve the followings: [3+4+3]

a) If integers $a = 4$, $b = 2$, $x=2$, $y=3a=(x/y)+a/b$; $b=(a*x)/y$; $x=a-b$; then what will be values of a , b and x

b) Output of the code:

```
int main() {  
    int i = 8, j=5; char c='c', d='d';  
    printf("%d", (3*i-2*j) % (2*d-c));  
    printf("%d", 2* ((i/5) + (4 *(j-3)) % (i+j -2)));  
    return (0);  
}
```

c) Convert the following math expressions to equivalent C statements.

i) $m = x^4 + \sqrt{x + \frac{y}{k}} - 4x + 6$

ii) $x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$

iii) $\text{Area} = \pi r^2 + 2\pi r h$

Ans:

a)

$a=4, b=2, x=2, y=3.$

$a=(x/y)+a/b;$ $a = (2/3)+4/2 = 2$ (computing as integer)

$b=(a*x)/y;$ $b = (2*2)/3 = 1$ (computing as integer)

$x=a-b$ $x = (2-1) = 1$

b)

```
int i = 8, j=5; char c='c', d='d';
```

```
printf("%d", (3*i-2*j) % (2*d-c));
```

```
printf("%d", 2* ((i/5) + (4 *(j-3)) % (i+j -2)));
```

Explanation of first printf: $(3*8-2*5) \% (2*100-99) = 14 \% 101 = 14$

Explanation of 2nd printf: $2*((8/5) + (4*(5-3)) \% (8+5 - 2)) = 2*((1+8)\%11)=2*9=18$

c)

Assuming that math.h library file is included and symbolic constant PI are defined as

```
#include <math.h>
```

```
#define PI 3.14
```

i. $m = \text{pow}(x,4) + \text{sqrt}((x+(y/k)) - 4*x + 6);$

ii. $x = (-b+\text{sqrt}(b*b-4*a*c)) / (2*a);$

iii. $\text{Area} = \text{PI} * r * r + 2 * \text{PI} * r * h;$

4. Write algorithm or flow chart with a C program to find area of a triangle by given 3 sides.

These should generate error if sum of two sides are not greater than third side.

Ans:

Algorithm

1. Start
2. Input sides a, b and c
3. $s \leftarrow (a+b+c)/2$
4. If ($s \leq a$ or $s \leq b$ or $s \leq c$) then
 - I. Print "Triangle is not possible"
5. Else
 - I. $area \leftarrow \sqrt{s(s-a)(s-b)(s-c)}$
 - II. Print area
6. Endif
7. End.

```
/* Program Area of a Triangle */
#include <stdio.h>
#include <math.h>
int main() {
    float a,b,c,s,area;
    printf("Enter sides of a triangle :");
    scanf("%f%f%f",&a,&b,&c);
    s=(a+b+c)/2;
    if(s<=a || s<=b || s<=c) {
        printf("Wrong dimensions!!!\n");
    }
    else {
        area=sqrt(s*(s-a)*(s-b)*(s-c));
        printf("Area of triangle = %.3f sq. unit\n",area);
    }
    return (0);
}
```

Expected Output

Enter sides of a triangle :4.5 6.76 7.03

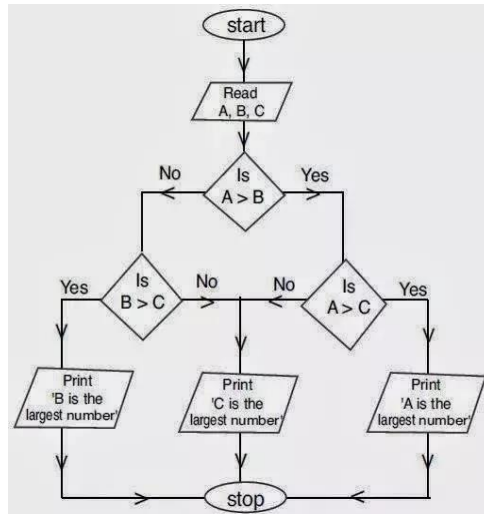
Area of triangle = 14.638 sq. unit

Enter sides of a triangle :4.2 5.34 13

Wrong dimensions!!!

5. Drawing a flow chart and write a C program to find maximum in 3 numbers using nested if structure.

Ans:



/*Program to find maximum in 3 numbers using nested if */

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    int n1,n2,n3,max;
```

```
    printf("Enter 3 numbers : ");
```

```
    scanf("%d%d%d",&n1,&n2,&n3);
```

```
    if(n1 > n2)
```

```
        if(n1 > n3)
```

```
            max=n1;
```

```
        else
```

```
            max=n3;
```

```
    else
```

```
        if(n2 > n3)
```

```
            max=n2;
```

```
        else
```

```
            max=n3;
```

```
    print("Maximum = %d\n",max);
```

```
    return (0);
```

```
}
```

6.

a) Explain Bitwise ~ (compliment) and Bitwise ^ (XOR) operators of C with example

b) Write the output of following statement assuming integers n1 = 4 and n2 = 5.

1. printf("%d", n1 & n2);
2. printf("%d", n1 | n2);
3. printf("%d", n1 & 1);

4. `printf("%d", n2 | 0);`
5. `printf("%d", n1 >> n2);`
6. `printf("%d", n1 << n2);`

Ans:

Bitwise operation for 100 and 101 (4 and 5 respectively)

1. $100 \& 101 = 100 = 4$ in decimal
2. $100 | 101 = 101 = 5$ in decimal
3. $100 \& 001 = 000 = 0$ in decimal
4. $100 | 001 = 101 = 5$ in decimal
5. $100 \gg 101 = 4 \gg 5$ right shifted 5 times so, result will be 0
6. $100 \ll 101 = 4 \ll 5$ left shifted 5 times so, $4 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$

7. Explain type casting. What happens when one tries to store a real number in a variable of type integer? What is the difference between implicit and explicit type conversion. Example with example

Ans:

Type conversion concept in C language is used to modify a variable from one data type to another data type. New data type should be mentioned before the variable name or value in brackets which to be typecast.

Example:

`result = (float) 20/3;`

- It is best practice to convert lower data type to higher data type to avoid data loss.
- Data will be truncated when higher data type is converted to lower. For example, if float is converted to int, data which is present after decimal point will be lost

Type conversion can be done 2 ways:

a) Implicit Type conversion / Coercion / Automatic type conversion

It is done by compiler automatically:

example:

`printf("%f", 20/3.00);`

b) Explicit Type conversion / A cast

By preceding the expression with type in parenthesis

It may be checked, unchecked or bit pattern.

Syntax:

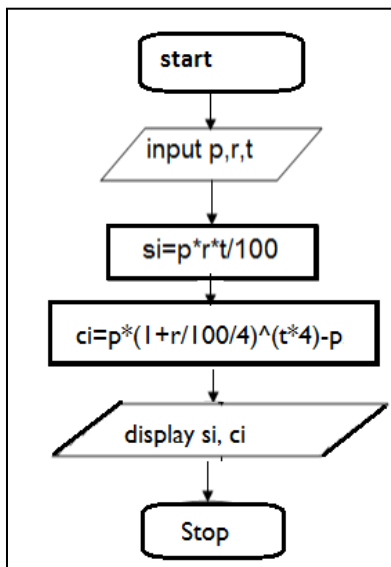
```

(type) expression;
int a = 10, b= 3;
float c;
c= (float) a/b; /* 3.333333 will be stored in c */

```

8. Drawing a flowchart write a C program to compute simple and compound interest by given principle, rate and time/term

Ans: Flowchart



```

/* Program to calculate simple & compound interest */
#include <stdio.h>
#include <math.h>
int main( ) {
    float p,r,t,si,ci;
    printf("Enter principle, rate and time : ");
    scanf("%f%f%f", &p, &r, &t);
    si=p*r*t/100.00;
    ci=p*pow((1+r/100/4),(t*4))-p; /* quarterly compounded */
    printf("Simple interest = %.2f\n", si);
    printf("Compound interest = %.2f\n", ci);
    return (0);
}

```

Expected output

Enter principle, rate and time : 1000 10 4

Simple interest = 400.00
Compound interest = 484.51

9. Write a C Program to create a Multiplication table of given number.

Ans:

```
/* Multiplication Table */  
#include <stdio.h>  
  
int main()  
{  
    long num;  
    int i;  
    printf("Enter number to create table : ");  
    scanf("%ld",&num);  
    printf("Multiplication Table of %ld :\n",num);  
    for(i=1;i<=10;i=i+1)  
    {  
        printf("%8ld x %3d = %12ld\n",num,i,num*i);  
    }  
    return (0);  
}
```

Expected output

Enter number to create table: 5

Multiplication Table of 5:

5 x 1 =	5
5 x 2 =	10
5 x 3 =	15
5 x 4 =	20
5 x 5 =	25
5 x 6 =	30
5 x 7 =	35
5 x 8 =	40
5 x 9 =	45
5 x 10 =	50