

Model Answer

PSP-21PSP23 - IAT-1

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1. Describe various types of computers according to the purpose, size, and speed.: 5 Marks

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.

1b: Explain Various types of Computer Networks: PAN, LAN, MAN, WAN

- The **Personal Area Network (PAN)** is a new type of network that describes two or more devices that are located on your person and normally connect to one another via bluetooth. A perfect example of a PAN is a cell phone connecting to a bluetooth headset or mobile computer connecting to a portable bluetooth thermal printer.
- **Local Area Networks (LAN)** are created by a group of devices in close proximity to one another and are normally located inside the same building or structure. A LAN can be as simple as two computers connected to a single switch via CAT5 cable or hundreds of cameras connected to a NVR (Network Video Recorder) and storage array via a group of distributed switches.
- **Metropolitan Area Networks (MANs)** are high speed private networks which are created by one or more dedicated point to point links between multiple locations. Each location normally has its own LAN and some level of routing will have to be done between the MAN and disparate LANs so that the two networks can communicate and share information.
- **Wide Area Network (WAN)** connects two or more LANs & MANs that can be located large distances from one another, even across the globe. A WAN can be your Internet connection or it can be a "private" point to point (no internet) frame relay, managed layer 2 or MPLS connection you get from your internet service provider (ISP).

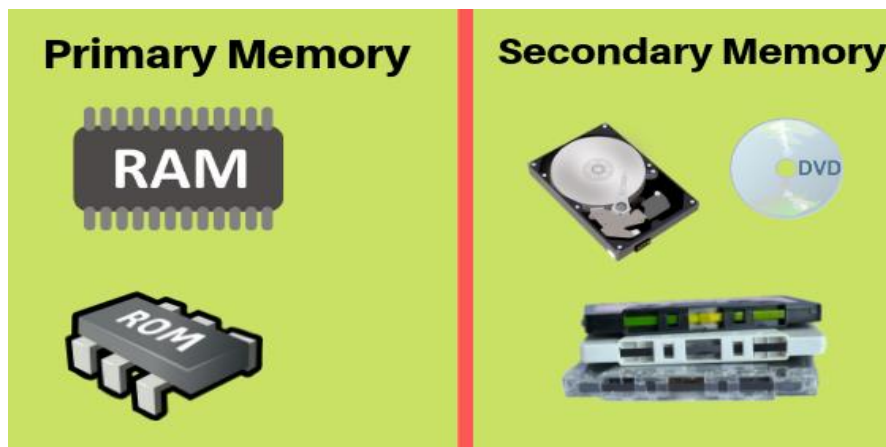


2a. Differentiate between Primary Memory and Secondary Memory

5M

Ans:

- **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
- The storage unit is Primary Memory (RAM) & Secondary (permanent storage devices: disks, tapes)



2b. List and explain various categories of software available in a computer. 5 Marks

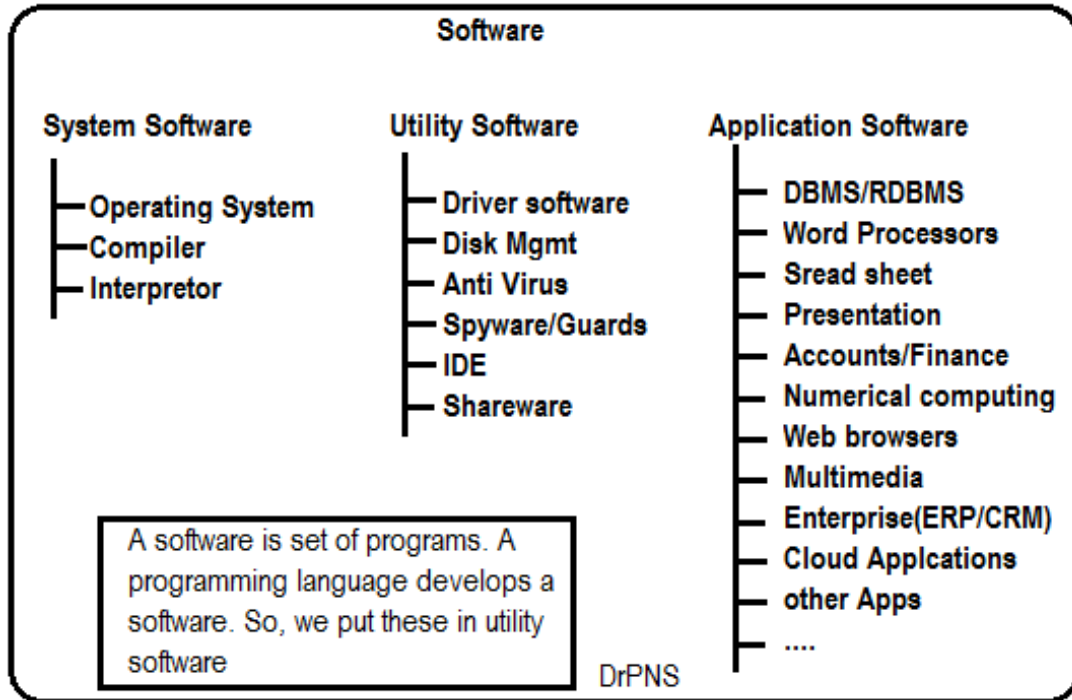
Ans:

Types of software:

System Software

Application Software:

Utility Software



3a. List different types of tokens available in C language. Briefly explain Keyword, identifier, string, special character with suitable example. 5 Marks

- Valid Characters (alphabets, numbers or symbols) used in C program are known as C – tokens.
- Each and every smallest individual units in a C program are known as C tokens.
- C tokens are the basic buildings blocks in C language which are constructed together to write a C program.
- C tokens are of six types. They are,
 - Keywords (eg: int, while),
 - Identifiers (eg: main, total),
 - Constants (eg: 10, 20),
 - Strings (eg: "total", "hello"),
 - Special symbols (eg: (), {}),
 - Operators (eg: +, /, -, *)

Example program for C - Tokens

```
int main()
{
    int x, y, sum;
    x = 10, y = 20;
    sum = x + y;
    printf ("Total = %d \n", sum);
}
```

where,
main – identifier (user defined function)

{}, (,) – delimiter
int – keyword
x, y, sum – identifier
main, {, }, (,), int, x, y, sum – tokens

3b. Classify following as valid/invalid identifier:

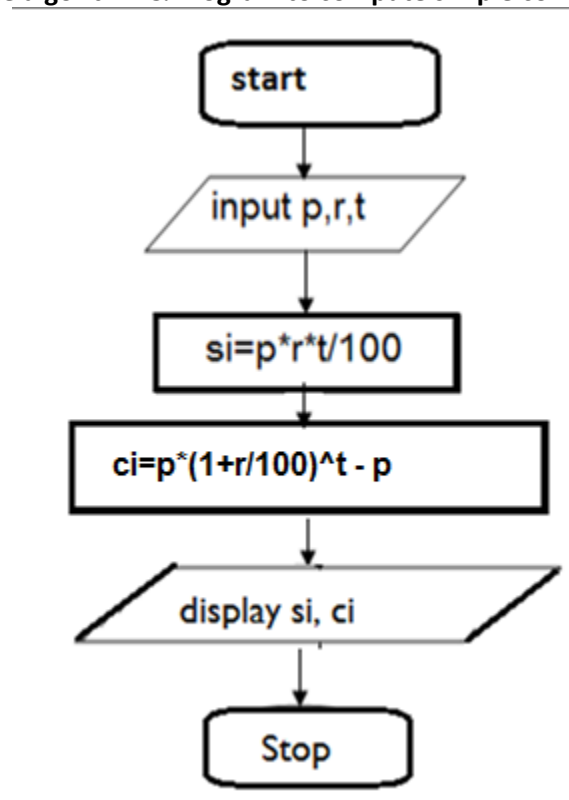
5 Marks

(a) num1 (b) \$num1 (c) +add (d) 1st_paper_marks (e) 9ab_c

Ans:

a) is valid and rest all are invalid. An identifier may have a-z, A-Z, 0-9 and _ (underscore) and it must not be started with a digit

4. Draw the flowchart, write algorithm & Program to compute simple compound interest. 10 Marks



Algorithm:

1. start
2. Input p,r,t
3. $si = p * r * t / 100.00;$
4. $ci = p * \text{pow}((1 + r / 100), t) - p;$
5. print si,ci

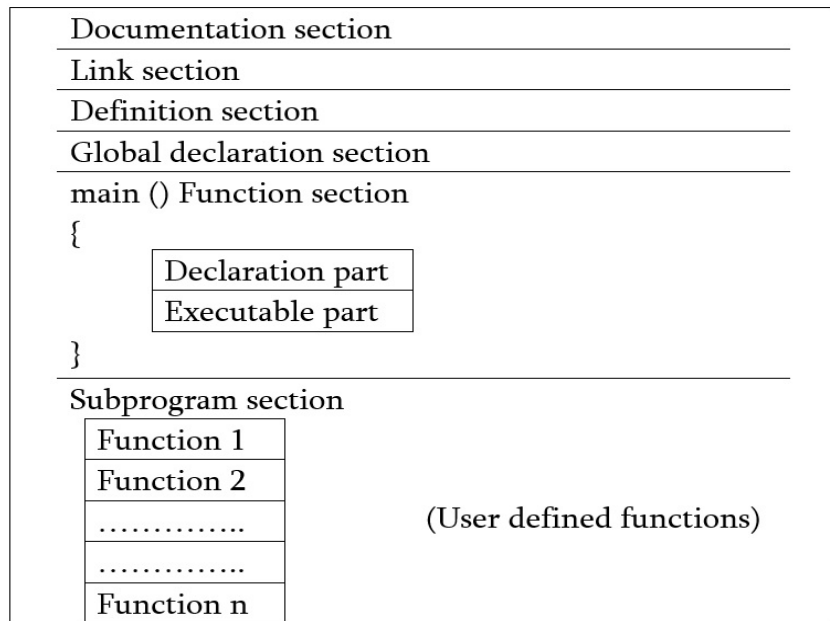
6. End.

```
/* 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),t)-p;
    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 = 464.10
```

5a. Write the structure of a C Program with example.



- **Documentation Section:** This section is used to write Problem, file name, developer, date etc in comment lines within /*...*/ or separate line comments may start with //. Compiler ignores this section. Documentation enhances the readability of a program.

- **Link section** : To include header and library files whose in-built functions are to be used. Linker also required these files to build a program executable. Files are included with directive #include
- **Definition section**: To define macros and symbolic constants by preprocessor directive #define
- **Global section**: to declare global variables – to be accessed by all functions
- **main()** is the user defined function which is recognized by the compiler first. So, all C program must have user defined function main() { }. It should have declaration part first then executable part.
- **Sub program section**: There may be other user defined functions to perform specific task when called.

/* Example: a program to find area of a circle – area.c

- **Documentation Section***/

```
#include <stdio.h>          /* - Link/Header Section */

#define PI 3.14             /* definition/global section */

int main()                  /* main function section */
{
    float r, area;          /* declaration part */

    printf("Enter radius of the circle : "); /* Execution part */
    scanf("%f", &r);
    area=PI*r*r; /* using symbolic constant PI */
    printf("Area of circle = %0.3f square unit\n", area);
    return (0);
}
```

5b. (i) W.r.t the given statements, find the final value of ‘x’

- (a) int a,b; float x; a=4; b=5; x=b/a ;
 (b) int a,b; float x; a=4; b=5; x=(float)b/a;

(ii) Convert following mathematical expressions into equivalent C language expressions:

(a)
$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$$

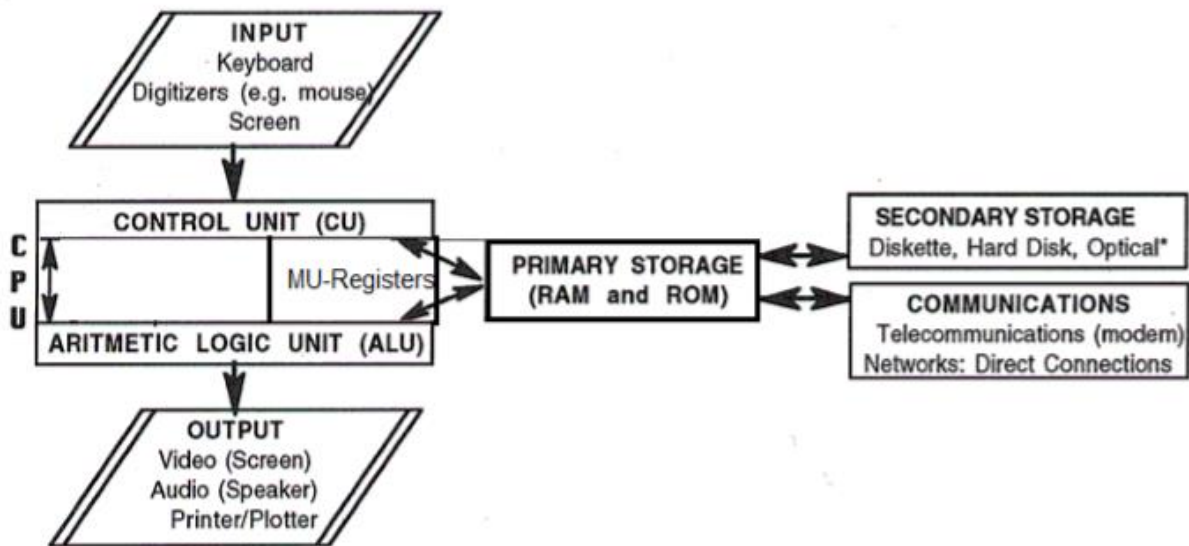
(b)
$$\frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

5 Marks

- i. a. $\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$
 b. $(-b + \sqrt{b^2 - 4ac}) / (2 * a)$
- ii. a. 1.000000 or Abnormal termination
- iii. b. 1.250000

6a. Draw the block diagram of Computer displaying its components.

5 M



6b. Explain 5 Generations of the computer

5 Marks

Ans:

Computer generations

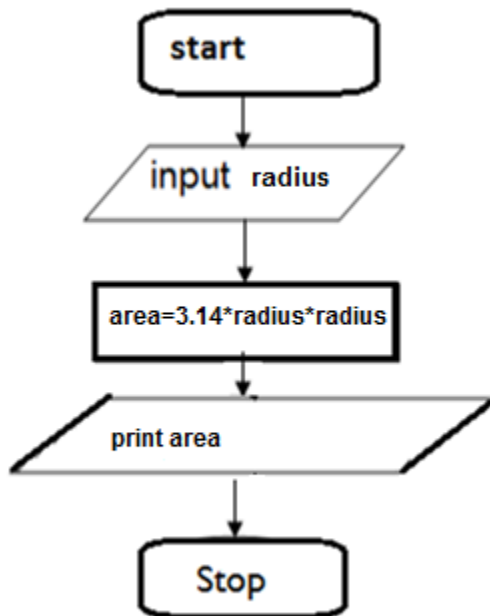
Generation	Duration	Devices	Purpose	Size & Speed	Examples
First	1940-50	Vacuum Tubes & Plug boards	General Purpose Electromechanical Systems	Huge & Very Slow	ENIAC, UNIVAC-I
Second	1950-60	Transistors/Semiconductors	Batch processing, Punched cards, Magnetic Tape	Little Big & slow	IBM 1401, MARK-III, UNIVAC 1107
Third	1960-70	IC(Integrated Circuits)	Parallel Processing, OS to manage Hardware, software & resources	Smaller & faster, Storage devices	IBM 360
Fourth	1970 onwards	LSI (Large Scale Integration)	GUI, Microprocessor, Networks & Internet	Small & very fast, Large storage capacity in MB	Intel C4004 8085, 8086, 80386 & 80486 Desktop PCs, Main Frame & Super computers
Fifth	Going on	VLSI	GUI & Network OS Ubuntu, , Android	Very small but Very-very Faster, Storage in Terabytes	Pentium I, II, III, IV, Dual core Laptops, Tablets, Smart Phones

7a. Write a C program to find area of a circle for the given radius. Also write the algorithm and draw a flowchart for the same

Algorithm

1. start
2. input radius
3. $\text{area} = 3.14 * \text{radius} * \text{radius}$
4. print area
5. end.

Flowchart to find area of a circle



```
/* Area of a circle */  
#include <stdio.h>  
#define PI 3.14  
int main()      {  
    float r, area;  
    printf("Enter radius of the circle : ");  
    scanf("%f", &r);  
    area=PI*r*r;  
    printf("Area of circle = %0.3f square unit\n", area);  
    return (0);  
}
```

7b. List & explain various types of constants available as C token (Ex: integer, real, string and character constants)

5 Marks

A constant is a value assigned to the variable which will remain the same throughout the program, i.e., the constant value cannot be changed.

Constants written in C:

Constant	Example
Integer constant	10, 11, 34, etc.
Floating-point constant	45.6, 67.8, 11.2, etc.
Octal constant	011, 088, 022, etc.
Hexadecimal constant	0x1a, 0x4b, 0x6b, etc.
Character constant	'a', 'b', 'c', etc.
String constant	"java", "c++", ".net", etc.

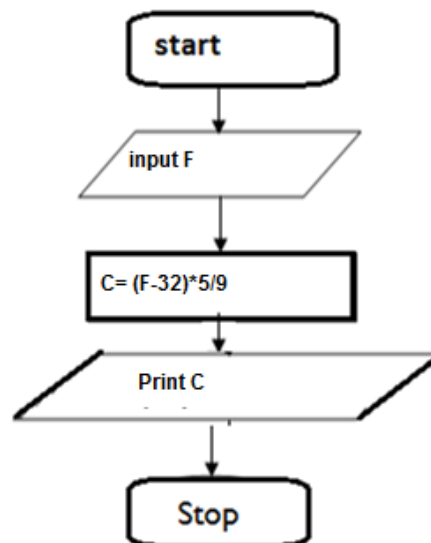
8a. Write algorithm and flowchart to convert Fahrenheit temperature to Centigrade. 5M

Ans:

Algorithm

1. start
2. Input F
3. $C = (F-32)*5/9$
4. Print C
5. End.

Flowchart



```

/* program to convert Fahrenheit to Centigrade */
#include <stdio.h>
int main()
{
    float f,c;
    printf("Enter temperature in Fahrenheit : ");
    scanf("%f",&f);
    c=(f-32)*5/9;
    printf("Equivalent temperature in Celsius = %.2f\n",c);
    return (0);
}

```

8b. Define data type. Explain fundamental data types of C language with their size. 5M

Ans:

- A data type is a classification of data, which can store a specific type of information.
- Primitive data types are primary, fundamental or predefined types of data, which are supported by the programming language.
- In C basic/fundamental/primitive data types with their sizes as per ANSI-C standard:

<u>Type</u>	<u>Size</u>
char	1 Byte
int	2 Bytes (4 bytes in new compilers)
float	4 bytes
double	8 Bytes