Computer Science, Career and Job

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Dedicated to my parents

Preface

First Edition

This book covers the interview Questions and answers from Computer Science And Information Technology related subjects.This book is written with the ins and outs of solved questions those are necessary for placement in different companies.The entire study material is divided into C programming,Data Structure, Operating System,Networking, Software Engineering,Database Management System,Object Oriented Technology And General Questions and Answers of Computer Science and Information Technology being taught.

I have tried to impart the best study material on this subject;still suggestions for further enhancement are welcome

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Table of Contents

C Programming

1.**What would be the output of the following Program?**

```
#include<stdio.h>
#include<conio.h>
void main()
{
printf(“%d”,printf(“sujoy”));
getch();
}
```

Soln: sujoy5

2.What would be the output of the following program?

```
#include<stdio.h>
#include<conio.h>
void main()
{
printf(“%%%%”);
getch();
}
```

Soln: %% because %% is the format specifier for %.

3. What would be the output for the following code snippet if we input 25 for the value of i?

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i;
printf(“%d”,scanf(“%d”,&i));
```

```
getch();
}
```
Soln: 1.scanf() is an input function.It will return the number of items returned.In this case only one variable i.e i.

4. What is main() in C?
Soln: main() is the first function called when program execution begins.The Operating System(OS) passes control to the main() function when the C program is executed.

5. What is the difference between %d and %*d in c language?
Soln: % prints decimal integer.%*d gives the address of the variable.

6. Difference between *p and **p?
Soln:*p is a pointer which holds the address of another variable while **p is a pointer to pointer which holds address of the pointer in which actual address of the other variable is stored.

7. What are the differences between for loop and while loop?
Soln: for loop is a fixed loop where counter is in-built whereas while loop is a variable loop where counter has to be placed.
The general syntax for for loop is

```
for(initialize counter;conditional test;reevaluation parameter)
{
statements;
}
```
Example

```
int i;
for(i=1;i<=10;i++)
{
printf("%d\t",i);
}
```
The general syntax for while loop is

```
while(condition)
{
statements;
}
```

Example

```
int i=1;
while(i<=10)
{
printf("%d",i);
}
```

8. What would be the output of the undermentioned program?

```
#include<stdio.h>
#include<conio.h>
void main()
{
int m=100,n=300;
while(++m<--n);
printf("%d",m);
getch();
}
```

Soln: 200.when the value of m and n will be 200 then the condition terminates.It will give mid value of m and n i.e 100+300/2=200.

9. What is pointer?

Soln: Pointer is a variable that holds the address of the another variable of same data type.For example int *p; where p is a pointer variable of int type.

10. What would be the output of the following program?

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

```
#define SQR(x)  x*x
void main()
{
int a,b=5;
a=25/SQR(b);
printf("%d",a);
getch();
}
```

Soln: 25.Here parentheses around macro expansion has been omitted.So macro expansion will not work.

11. Write a Program in C to display the maximum of two numbers using macro expansion.

Soln:

```
#include<stdio.h>
#include<conio.h>
#define MAX(x,y) x>y?x:y
void main()
{
int a,b,c;
clrscr();
printf("\n Enter the values of an and b");
scanf("%d%d",&a,&b);
c=MAX(a,b);
printf("%d",c);
getch();
}
```

12. Write a C program to display the address of a given variable.

Soln:

```
#include<stdio.h>
#include<conio.h>
void main()
```

```
{
int a;
clrscr();
printf("%u",&a);
getch();
}
```

13. Write a program in C to interchange the values of two variables using macro expansion.

Soln:

```
#include<stdio.h>
#include<conio.h>
#define SWAP(x,y) int t;t=a,a=b,b=t
void main()
{
int a,b;
clrscr();
printf("\n Enter the values of a and b");
scanf("%d%d",&a,&b);
SWAP(a,b);
printf("\n After swapping the values of a and b are %d%d",a,b);
getch();
}
```

14. What is array?

Soln: An array can be defined as an infinite collection of homogeneous elements i.e an array is a collection of similar elements.

The general syntax for array is

data type array name[size];

Example int a[30];

15.What are the differences between while loop and do while loop?

Soln: The main differences between while loop and do while loop is

1) while loop tests the condition before executing any of the statements

within the loop whereas do while loop tests the condition after having executed the statements within the loop.
2) do while loop would execute its statements at least once if the condition fails for the first time whereas while loop would not execute its statements if the condition fails for the first time
3) The general syntax for while loop is

```
while(condition)
{
statements;
}
```

Example

```
int i=1;
while(i=10)
{
printf("%d",i);
i++;
}
```

The general syntax for do while loop is

```
do
{
statements;
}
while(condition);
```

Example

```
int i=1;
do
{
printf("%d",i);
}
while(i<=10);
```

16. What is structure in C?
Soln: Structure is a user define data type which collection of one or more variables grouped under a single name for each manipulation.

Structure can be defined as heterogeneous collection of elements.
Each variable within a structure is called the member of the structure.
The general syntax for structure is
struct <structure name>
{
data type element 1;
data type element 2;
data type element 3
….....
….....
}

17.What are the differences between malloc() and calloc()?
Soln: The differences between malloc() and calloc() are
1) malloc() allocates a single block of memory whereas calloc() allocates multiple blocks of memory.
2) One argument needed by malloc() where calloc needs two arguments.
3) Memory allocated by malloc() contains garbage values whereas memory allocated by calloc() contains all zeros.
4) The general syntax for malloc() is
int *ptr;
ptr=(int*) malloc(sizeof(int));
The general syntax for calloc is
int *ptr;
ptr=(int*) calloc(number of arguments,size of each argument);

18. What will be printed as the result of the operation below:
main()
{
int x=10, y=15;
x = x++;
y = ++y;
printf(“%d %d”,x,y);

}
Soln:11 16.

19.what are the differences between searching and sorting?
Soln: Searching is the process of finding the desired record in the search table whereas sorting is the process of arranging elements in particular order.

20.What will be printed for the operation below?
#include<stdio.h>
#include<conio.h>
#define PRINT printout
void main()
{
printf("PRINT");
getch();
}
a. Error
b. print out
c. PRINT
d. no output
Soln: c. PRINT.

21. What is the similarity between a structure, union and enumeration?
a. All of them let you define new values
b. All of them let you define new data types
c. All of them let you define new pointers
d. All of them let you define new structures
Soln: b is the correct answer.

22. How will you free the allocated memory ?
a. remove(var-name);

b. free(var-name);
c. delete(var-name);
d. dealloc(var-name);
Soln: b.

23. Is C structured language?
Soln: yes, C is a Structured Programming Language.

24.Give the output of printf("%d")?
Soln: Nothing is there after %d so window garbage value is displayed by the compiler.

25. What are the salient differences between function and macro?
Soln:

Macro	Function
1.Macro is preprocessed.	1.Function is compiled.
2. No Type checking.	2.Type checking is done.
3. Code length increases.	3. Code length remains same.
4. Use of macro can lead to side	4. No side effect.
5. Speed of execution is faster	5. Speed of execution is slower
6. Before compilation macro name is replaced by macro value.	6. During function call,transfer of control takes place.
7. Useful where small code appears many times.	7. Useful where large code appears many times.
8. Macro does not check compile errors.	8. Function checks compile errors
9.Generally macros do not extend beyond one line.	9. Function can be of any number of lines.

26.The Bitwise OR operator

a. Unary operator
b. Binary operator
c. Ternary operator
d. Octal operator
Soln: b.

27.Heap
a. is a region from where memory is allocated
b. lies between your program and the stack
c. is a finite area
d. all of the above
Soln: d.

28. The typedef statement is used to
a. define new type of data
b. define new names for the already existing type of data
c. to define new types of functions
d. both a and b
Soln:b.

29. What will be the output after the following program is executed?

```
#include<stdio.h>
main()
{
int *p,q;
q=100;
p=&q;
printf("%d",*p);
}
```

a. 1
b. 10
c. 100

d. 1000
Soln: c.

30. The logical NOT operator represented by ! is a
a. Unary operator
b. Binary operator
c. Octal operator
d. Ternary Operator
Soln: a.

31. The main() function is always
a) a called function
b) a calling function
c) recursive function
d) used at the end of the program
Soln: b.

32. We write the following statements
char *s=”MICROPROCESSOR”;
printf(“%s”,str+5);
The message printed is
a. MICRO
b. PROCESSOR
c. An error message
d. PROCESS
Soln: b.

33. What will be the output the following program is executed?
#include<stdio.h>
#include<conio.h>
main()
{
char str[80]= I like C”;

strcpy(str,”hello”);
printf(str);
a. I like C
b. 80 elements of array
c. hello
d. gives error
Soln: c.

34. The string HELLO WORLD needs
a. 11 bytes
b. 12 bytes
c. 10 bytes
d. 8 bytes
Soln: b.

35. What will be the output the following program is executed?
```
main()
{
char *p;
p=”%d\n”;
p++;
printf(p-2,300);
}
```
Soln: 300.

36. What will be the output the following program is executed?
```
void main()
{
static int i=i++,j=j++,k=k++;
printf(“%d%d%%d”,i,j,k);
}
```
Soln: 111.Static variables are initialized to zero by default.

37. What will be the output the following program is executed?

```
main()
{
char not;
not=!2;
printf(“%d”,not);
}
```

Soln:0.Here 2 is a non zero value.So TRUE.!TRUE is FALSE(0).So it prints 0.

38.What will be the output after the following program is executed?

```
void main()
{
char a[]='\0';
if(printf("%s",a))
printf("OK here\n");
else
printf("Forget it\n);
}
```

Soln: OK here.

39. What would be the output?

```
main()
{
 int i =10, j = 20;
 clrscr();
 printf("%d, %d, ", j-- , --i);
 printf("%d, %d ", j++ , ++i);
}
```

a. 20, 10, 20, 10
b. 20, 9, 20, 10

c. 20, 9, 19, 10
d. 19, 9, 20, 10 [HCL]

Soln: c. 20,9,19,10
In the first statement in printf() there is j--.--i.So the value of j will be 20 for post decrement and the value of i will be 9 for pre decrement.Then in the first statement due to pre-decrement value of j will be 19.In the second statement there is post-increment no change the value of j will be 19 and due to pre increment i will be 10.So c. is the correct answer.

40. What would be the output of the following code snippet?

```
main()
{
int m=100,n=300;
while(++m<--n)
printf("%d",m);
}
```

a. infinite loop
b. run time error
c. compile time error
d. 200

Soln: d. 200.It will give 100+300/2=200.m will be incremented and n will be decremented.When both are 200 the condition fails.200 will be printed.

41. What is the output of printf("%d")?

a.run time error

b.compile time error
c.garbage values
d. None
Soln:c.garbage values.

42. What is the purpose of main() function?
soln: In C, program execution starts from the main() function. Every C program must contain a main() function. The main function may contain any number of statements. These statements are executed sequentially in the order which they are written.
The main function can in-turn call other functions. When main calls a function, it passes the execution control to that function. The function returns control to main when a return statement is executed or when end of function is reached.
In C, the function prototype of the 'main' is one of the following:

```
int main(); //main with no arguments
int main(int argc, char *argv[]); //main with arguments
```

43. What would be the output of the following code snippet?
```
void main()
{
enum days{mon=-1,tues,wed=6,thu,fri,sat};
printf("%d",sat);
}
```
a. Error
b. Garbage
c. 9
d. None [HCL]
Soln:c. 9.wed=6,next element in the list will be one more than the previous element.So thu 7,fri 8 and sat 9.

44. What would be the output of the following program?

```
#define SQR(x) x*x
main()
{
printf("%d", 225/SQR(15));
}
```

a. 1
b. 225
c. 15
d. none of the above [HCL]

Soln: b.225.We have omitted parentheses around macro expansion,so it will not work.

45. What would be the output of the following program?

```
#define MAX(a,b) (a>b?a:b)
void main()
{
int x=7,y=5,z;
clrscr();
z=(++x,5);
printf("%d",z);
}
```

a. 8
b. 9
c. compilation error
d. none
Soln: b. 9.

46.What would be the output of the following program?

```
#define MAX(a,b) (a>b?a:b)
void main()
```

```
{
int x=7,y=5,z;
clrscr();
z=(x++,5);
printf("%d",z);
}
```
a. 8
b. 9
c. compilation error
d. none
Soln: a. 8.

47. What is the difference between #include<stdio.h> and #include"stdio.h"?

#include "stdio.h"
This command would look for the file stdio.h in the current directory as well as the specified list of directories as mentioned in the include search path that might have been set up
#include<stdio.h>
This command would look for the file stdio.h in the specified list of directories only.

48. What would be the output of the following program?

```
void main()
{
if(2)
printf("hello");
else
printf("hi");
}
```
Soln:hello.Expression within if clause evaluated to be true if the evaluated value is non-zero.2 is non zero.So output will be hello.

49. What would be the output of the following program?

```
void main()
{
if(2,5,6,8,4,6,0)
printf(“hello”);
else
printf(“hi”);
}
```

Soln: hi.Here rightmost value is 0.0 is always false in C.

50. Difference between for and while loop?

Soln: for loop is fixed loop.counter is in built whereas while loop is variable loop.counter has to be placed.

51. What would be the output of the following program?

```
void main()
{
int m=3,n=2,p;
p=m+++n;
printf(“%d”,p);
getch();
}
```

Soln: Output will be 5 because ++ will be evaluated first.So post increment happens.First value of m and will be stored in p then the value of m will be incremented.

52. What would be the output of the following program?

```
void main()
{
int x=2,y;
y=x++ + --x+ --x;
printf(“%d”,y);’
getch();
```

}
Soln:There are two pre decrement and one post increment.The value of x will be evaluated from right to left.After first decrement the value of will be 1 after second decrement the value of x will be 0.The value of x can not be different.So the current value of x i.e 0 will be stored in y.So the output will be 0.

53. What would be the output of the following program?

```
void main()
{
int i=5,j;
j=i++ + ++i + ++i - ++i;
printf(“%d”,j);
getch();
}
```

Soln: Output will be j=8+8+8-8=16.

54. What is header file in C programming?

Soln: Files that are placed at the header section of a C program are called the header files.

The header files are used to provide the necessary information in support of the various library functions.

Each header files contains declaration for related library function.

55. What would be the output of the following program?

```
main()
{
char *Str1="abcd";
chat Str2[]="abcd";
printf("%d %d %d",sizeof(str1),sizeof(str2),sizeof("abcd"));
}
```

Soln: Str1 is character pointer.It gives the size of the pointer

variable.Str2 is a array name whose size is 5(including null).
So the output will be 2 5 5.

56. What would be the output of the following program?

```
main()
{
printf("%d, %d", sizeof('c'), sizeof(100));
}
```

Sol:2,2.Because sizeof return the memory occupied and "c" uses 1 byte to store character 'c' and the other byte to store NULL to indicate the end of string. 100 being stored as an integer would take 2 bytes.

57. What are the advantages of function?

Soln:
Advantages
1) It reduces the Complexity in a program by reducing the code.
2) It also reduces the time to run a program.
3) Its easy to find-out the errors due to the blocks made as function definition outside the main function.
4) Increases program readability.
5) Code re-usability increases.

58. What are the uses of pointer?

Soln:
Uses of Pointer
i) Accessing array elements.
ii) Allocating memory for the system dynamically
iii) creating data structures such as linked lists,trees,graphs and so on.
iv) passing arguments to function by reference (passing the address).

59. What would be the output of the output of the following

program?

```
#include<stdio.h>
#include<conio.h?
#define SQR(x) (x*x)
void main()
{
int a=3,b;
clrscr();
b=SQRT(a+2);
printf("\n%d",b);
getch();
}
```

Soln: Output 11.

60. What would be the output of the following code snippet?

```
#include<stdio.h>
#include<conio.h>
#define sum(a) (a+a)
void main()
{
 int a=5,b;
 clrscr();
 b=sum(a++);
  getch();
  }
```

Soln: On Preprocessing macro would be expanded as b=(a++)+(a++) i.e (6+6)=12

61. The default parameter passing mechanism is

a. call by value
b. call by reference

c. call by name
d. none

Soln: a.

62. What would be the output of the following C program?

```
main()
{
inc();inc();inc();
inc()
{
static int x;
printf("%d",++x);
}
```

a. prints 012
b. prints 123
c. prints 111
d. none

Soln: b.

63. What would be the output of the following C program?

```
main()
{
int a=5,b=2;
printf("%d",a+++b);
}
```

a. results in syntax error
b. prints 7
c. prints 8
d. none

64. What would be the output of the following C program?

```
main()
{
printf("%u",main );
}
```
results in
a. printing of a garbage number
b. an execution error
c. printing of starting address of function main
d. an infinite loop

Soln: c.

65. Consider the declaration

```
 int a=5, *b=&a;
printf("%d",a*b); prints
```
a. error message
b. garbage
c. both (a) and (b)
d. none

Soln: a.

66. Consider the declaration

```
 int a=5, *b=&a;
printf("%d",a**b); prints
```
a. 25
b. 0
c. garbage
d. error message

Soln: a.

67. Consider the following program

```
main()
{
int c=50;
for(;c;)
c--;
printf("%d\n",c);
}
```

The output of the program will be

a. 50

b. 0

c. -50

d. none

Soln: b.

68. Consider the following program fragment

```
switch(choice)
{
case 'R': printf("RED");
case 'W': printf("WHITE");
case 'B': printf("BLUE");
default: printf("ERROR");
break;
}
```

What would be the output if the choice='R'?

a. RED

b. RED ERROR

c. RED WHITE BLUE ERROR

d. RED WHITE BLUE

Soln: c.

69. The output of the following program

```
main()
{
int a,*ptr,b,c;
a=25;
ptr=&a;
b=a+30;
c=*ptr;
printf("%d%d%d",a,b,c);
}
```

a. 25,25,25
b. 25,55,25
c. 25,55,55
d. none

Soln: b.

70. Consider the following program fragment

```
main()
{
int a,b,c;
b=2;
a=2*(b++);
c=2*(++b);
}
```

Which of the following is correct?
a. a=4,c=6
b. a=3,c=8
c. b=3,c=6
d. a=4,c=8

Soln: d.

71. What are the differences between Compiler and Interpreter?

Soln:

Compiler	Interpreter
i) Compiler translates whole program at a time.	i) Interpreter translates the the source code of a program line by line.
ii) It produces an object code.	ii) It does not produce any object code for further execution without itself.
iii) Using compiler is secured.	iii) use of interpreter based code is not secured as source code has to be executed every time.
iv) Compilers are used mostly for desktop standalone applications. examples-Java,C,C++	iv) Interpreters are used for web based applications. examples-PERL,PHP

72. What is modular programming?what are the advantages of modular programming?

Soln: Modular programming-If a program is lengthier it becomes very difficult for the programmer to handle.
Normally larger programs are more prone to errors and it would be a tedious job to locate and correct the errors.
such programs should be broken down into a number of small logical

component each of which serves a specific task.
The process of splitting the lengthier and complex programs into a number of smaller units(called modules or subprograms) is called modularization.Programming with such approach is called modular programming.
Advantages
1) Reusability-If a particular set of instructions is to be accessed repeatedly from several different places within a program then we can make this group of instructions as one module and call it whenever necessary.This avoids re-writing of functions on every access.
2) Debugging- Debugging is easier since each module is smaller and clear as the user can easily locate the errors and correct them.
3) Build library- It allows the programmer to build a library, of most commonly used subprogram.This reduces time and space complexity.It increases program portability.

73. What would be the output of the following program fragment?
printf("%c",100);
a. prints 100
b. prints the ascii equivalent of 100.
c. prints garbage
d. none
Soln: b.

74. What would be the output of the following program?
main()
{
printf("%c","abcdefgh"[4]);
}
a. error
b. d
c. e
d. none

Soln: c.

75. What would be the output of the following program?

```
main()
{
printf(5+"fascimile");
}
```

a. error
b. fascimile
c. mile
d. none

Soln: c.

76. What would be the output of the following program?

```
#include<stdio.h>
#include<conio.h>
void main()
 {
struct emp
  {
 char name[20];
  int age;
  float sal;
 }
  struct emp e={“tiger”};
printf(“\n%d%f”,e1.age,e1.sal);
}
```

a. 0.000000
b.Garbage values
c. Error

d. None
Soln: a.0.000000
When an automatic structure is partially initially then the remaining elements of the structure are initialized to zero.

77. What would be the output of the undermentioned program?

```
main()
{
static char st[]=”Good Morning”;
printf(“%s”,st+3);
}
```

a. Morning
b. Good
c. d Morning
d. None
Soln: c. d Morning. The expression st+3 points to the 3rd element of the string.By using %s in the printf statement, the entire string starting from 3rd element gets printed.

78. Why scope resolution operator is used?
Soln: When both local and global variables have the same name the scope resolution operator can be used to select global variables explicitly.

```
#include<stdio.h>
int a=10;
main()
{
int a=20;
printf(“%d”,a);
printf(“%d”,::a);
}
```

The output would be 20 10.First printf statement will print local variable and second printf statement will print global variable.

79. The output of the following program

```
#include<stdio.h>
struct
{
char name[25];
int idno;
float salary;
}emp;
union
{
char name[25];
int idno;
float salary;
}desc;
void main()
{
printf("The size of the structure is %d",sizeof(emp));
printf("\nThe size of the union is %d",sizeof(desc));
}
```

a. The size of structure is 31
The size of the union is 25
b. The size of the structure is 25
The size of the union is 31
c. The size of the structure is 25
The size of the union is 25
d. The size of the structure is 31
The size of the union is 31
Soln: a. The size of the structure is 31
The size of the union is 25.Because structure members share different memory locations and union members share same memory locations.

80. How is a comment formed in C?

Soln: Comments in C begin with a slash followed by an asterisk.Any text may then appear including newlines.Comments finish with an asterisk followed by slash.Example
/* This is a comment */

81. Can comments be nested?
Soln: Not in standard C.

82. What is the difference between & and && operators and | and || operators?
Soln: & and && operators denote bitwise AND and logical AND whereas | and || denote bitwise OR and logical OR.

83. What is void pointer?
soln: A void pointer is a pointer that can point any kind of object at all.It is used when a ponter must be specified but the type is unknown.

84. How to run C from UNIX?
Soln: The Unix has a C compiler called cc.To compile C program
The command in the editor(vi,gedit,emacs etc) will be
cc hello.c (where hello.c is the file name).
a.out is produced by default.To execute C program the command will be a.out in the editor.

85. What is the difference between if and switch statement?
Soln: The switch differs from if in that switch can only test for equality whereas if can evaluate any type of relational or logical expression.
If character constants are used in the switch statement they are automatically converted to integer.

86. What are the differences between array and structure?
Soln:

Array	**Record/structure**

i) An array is a homogeneous collection of elements that is all elements have same type.	i) A record is a heterogeneous collection of elements that is each element can have a different type.
ii) Actual array elements are selected at run time.	ii) Actual record elements are selected at compile time
iii) In an array each element occupies the same amount of space	ii) In record each element occupies different space
iv) In arrays we can access indivitual elements of an array using a subscript.	iv) Structures use a different schema-dot operator

87. What are the differences between union and structure?

Soln:

1) Union elements share the same memory location where as structure elements share different memory locations.For example

```
struct student
{
 char name;
 int roll;
 float marks;
};
```

```
union student
{
char name;
int roll;
float marks;
};
```

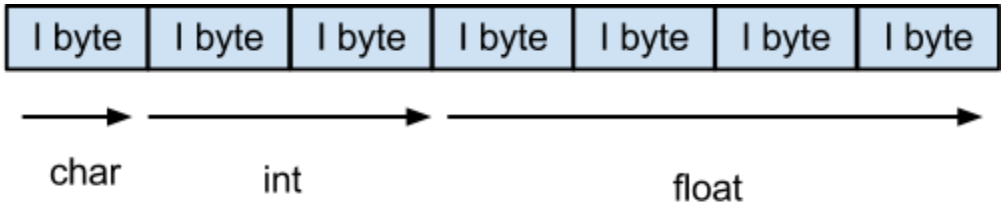


Fig: Structure

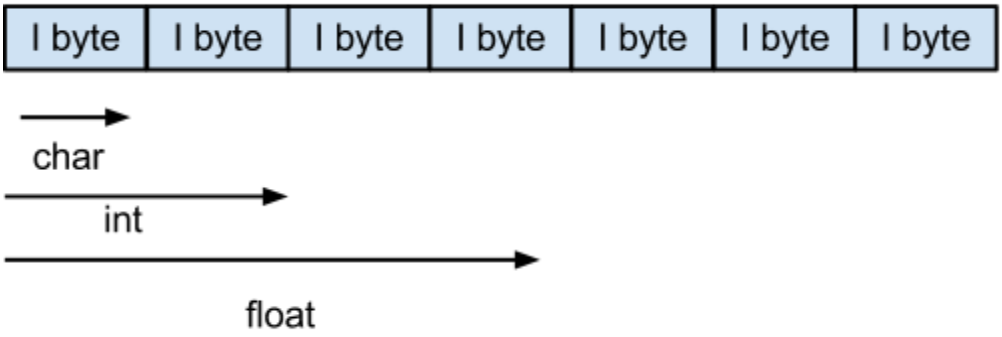


Fig:Union

2) Union allocates memory equal to the maximum memory required by the member of the union i.e in the above figure maximum memory required is 4 bytes.
Structure allocates the memory equal to the sum of the memory allocated to its indivitual members i.e in the above figure sum of memory is 7 bytes required by the structure.
3) Self referential union can not be implemented in data structure but self referential structure can be implemented.
4) As memory is shared ambiguity is more in union but less in structure.
5) Union is best in the environment where memory is less as it shares the memory allocated.

88. What is the difference between branching and looping?
Soln: Branching means what actions to take whereas looping means deciding how many times to take a certain action.

89. What are the differences between break and continue?
Soln:

Break	Continue
1. Break statement is used to exit from the loop or block.	1. Continue statement is used to skip the current loop iteration/statement and passes the control to the next statement.
2. Terminates the loop.	2. Never terminates the loop.
3. Passes the control to the next loop.	3. Passes the control to the next statement.

90. What is Macro?
Soln: Macro:This directive defines an identifier and a character sequence(a set of characters) that will be substituted each time it is encountered in the source file.The identifier is referred to as macro name or macro and the replacement process as the macro replacement.The general syntax for Macro expansion is
#define macro name character sequence
Example

```
#include<stdio.h>
#include<conio.h>
#define sum(a) (a+a)
void main()
{
int b=5,c;
c=sum(b++);
```

```
getch();
}
```
Output
12

91. What is preprocessor?

Soln: The preprocessor is a program that processes the source program before it is passed to the compiler.

92. What are the differences between if and switch statement?

Soln: The switch differs from if in that switch can only test for equality whereas if can evaluate any type of relational or logical expression.
If character constants are used in the switch statement they are automatically converted to integer.

93. What are the advantages of switch statement over if else statement?

Soln: The switch statement executes faster than the if else statement because the switch statement checks the condition first and jumps to the suitable case statement at the case whereas in the if else it will check every conditions so that the execution time will be more and the code becomes lengthy and become very difficult to understand.

94. What is recursion?

Soln: Recursion is a process by which a function a function calls itself repeatedly until some specified condition has been satisfied.The process is used for repetitive computation in which each action is started in terms of a previous result.Many iterative problems may be solved in this form.

95. Why register variable is used?

Soln: These variables are used when the program references the variables very frequently.For example loop variable can be declared as register variable; it will speed up the process of execution.

Example

```
void main()
{
reg int x;
for(x=1;x<=10;x++)
{
printf("%d\n",x);
}
getch();
}
```

96. What are the differences between Compiler and Interpreter?

Soln:

Compiler	Interpreter
i) Compiler translates whole program at a time.	i) Interpreter translates the the source code of a program line by line.
ii) It produces an object code.	ii) It does not produce any object code for further execution without itself.
iii) Using compiler is secured.	iii) use of interpreter based code is not secured as source code has to be executed every time.
iv) Compilers are used mostly for desktop standalone applications. examples-Java,C,C++	iv) Interpreters are used for web based applications. examples-PERL,PHP
v) Easy debugging for	v) Difficult debugging for errors.

errors.

vi) Large amount of memory spaces are required.	vi) Small amount of memory spaces are required.
vii) Faster.	vii) Slower.
viii) Costlier.	viii) Cheaper.

97. What will be the output?

```
 float a=.7;
if(a=.7)
printf("this");
else
printf("that");
```

Soln: this

98. What will be the output?

```
main()
{

int a=5;
a=a---1;
printf("%d",a);
}
```

Soln: 5

99. What will be the output?

```
main()
{
char **p="Hello"
printf("%s",**p);
}
```

Ans Garbage value.

100.

```
main()
{
```

```
int x=5;
printf("%d%d",x++,++x);
}
```
Soln: 6 6;

101. What will be the output?

```
main()
{
int x=5;
printf("%d"printf("%d"%d",x,x););
}
```
Soln: 6 5 5;

102. What will be the output?

```
 main()
{
int i=0,n=6;
while(n--0);
i+=n;
printf("%d",i);
}
```
Soln:-1

103.What will be the output?

```
main()
{
char a[]="hello";
printf("%c\n",*a++);
}
```
Soln:Error

104.What will be the output?

```
main()
{
int a=3,b=2,c=1;
k=a<b<c-1;
printf("%d",k);
}
```
Soln:0

105.What will be the output?

```
main(){
float me = 1.1;
double you = 1.1;
if(me==you)
C Aptitude
printf("I love U");
else
printf("I hate U");
}
```

Soln:

I hate U

Explanation:

For floating point numbers (float, double, long double) the values cannot be predicted exactly. Depending on the number of bytes, the precession with of the value represented varies.

Float takes 4 bytes and long double takes 10 bytes. So float stores 0.9 with less precision than long

double.

106. What is wild pointer?

Soln: A pointer in c which has not been initialized is known as wild pointer.

Example:

```
int main(){
int *ptr;
printf("%u\n",ptr);
printf("%d",*ptr);
return 0;
}
```

Output: Any address

Garbage value

Here ptr is wild pointer because it has not been initialized. There is difference between the NULL pointer and wild pointer. Null pointer

points the base address of segment while wild pointer doesn't point any specific memory location.

107.What will be the output?

```
main()
{
static int var = 5;
printf("%d ",var--);
if(var)
main();
}
```

Soln:5 4 3 2 1

Explanation:

When static storage class is given, it is initialized once. The change in the value of a static variable is retained even between the function calls. Main is also treated like any other ordinary function, which can be called recursively.

108.What will be the output?

```
 main()
{
char *p;
printf("%d %d ",sizeof(*p),sizeof(p));
}
```

Soln:

1 2

Explanation:

The sizeof() operator gives the number of bytes taken by its operand. P is a character

pointer, which needs one byte for storing its value (a character). Hence sizeof(*p) gives a value of 1.

Since it needs two bytes to store the address of the character pointer sizeof(p) gives 2.

109. What will be the output?

```
main()
{
```

```
 printf("%x",-1<<4);
}
```
Soln:
fff0
Explanation :
-1 is internally represented as all 1's. When left shifted four times the least significant 4 bits are filled with 0's.The %x format specifier specifies that the integer value be printed as a hexadecimal value.

110. What will be the output?

```
main()
{
int i=-1,j=-1,k=0,l=2,m;
m=i++&&++&& k+||+;
printf("%d %d %d %d %d",i,j,k,l,m);
}
```
Soln:
0 0 1 3 1
Explanation :
Logical operations always give a result of 1 or 0 . And also the logical AND (&&) operator has higher priority over the logical OR (||) operator. So the expression 'i++ && j++ && k++' is executed first. The result of this expression is 0 (-1 && -1 && 0 = 0). Now the expression is 0 || 2 which evaluates to 1 (because OR operator always gives 1 except for '0 || 0' combination- for which it gives 0). So the value of m is 1. The values of other variables are also incremented by 1.

111. What will be the output?

```
main()
{
printf("\nab");
printf("\bsi");
printf("\rha");
}
```
Soln:
hai
Explanation:
\n - newline
\b - backspace

\r - linefeed

112. What will be the output?

```
main()
{
int i=5;
printf("%d%d%d%d%d%d",i++,i--,++i,--i,i);
}
```

Soln:
45545
Explanation:
The arguments in a function call are pushed into the stack from left to right. The evaluation is by popping out from the stack. and the evaluation is from right to left, hence the result.

113. What will be the output?

```
 #define square(x) x*x
main()
{
int i;
i = 64/square(4);
printf("%d",i);
}
```

Soln:64

114. What will be the output?

```
 main()
{
int c=- -2;
printf("c=%d",c);
}
```

Soln:
c=2;
Explanation:
Here unary minus (or negation) operator is used twice. Same maths rules applies, ie. minus * minus= plus. Note:However you cannot give like --2. Because -- operator can only be applied to variables as a decrement operator (eg., i--). 2 is a constant and not a variable.

115.What will be the output?

```
 #include <stdio.h>
#define a 10
main()
{
#define a 50
printf("%d",a);
}
```

Soln:
50
Explanation:
The preprocessor directives can be redefined anywhere in the program. So the most recently assigned value will be taken.

116.What will be the output?

```
#define clrscr() 100
main()
{
clrscr();
printf("%d\n",clrscr());
}
```

Soln:
100
Explanation:
Pre Processor executes as a separate pass before the execution of the compiler. So textual replacement of clrscr() to 100 occurs.The input program to compiler looks like this :

```
{
100;
printf("%d\n",100);
}
```

Note:
100; is an executable statement but with no action. So it doesn't give any problem.

117. What will be the output?

```
enum colors {BLACK,BLUE,GREEN}
main()
{
```

```
printf("%d..%d..%d",BLACK,BLUE,GREEN);
return(1);
}
```
Soln:
0..1..2
Explanation:
enum assigns numbers starting from 0, if not explicitly defined.

118. What will be the output?

```
 #define f(g,g2) g##g2
main()
{int var,12=100;
printf("%d",f(var,12));
}
```
Soln:
100

119. What will be the output?

```
main()
{i
nt i=0;
for(;i++;printf("%d",i)) ;
printf("%d",i);
}
```
Soln:
1
Explanation:
before entering into the for loop the checking condition is "evaluated". Here it evaluates to 0 (false) and comes out of the loop, and i is incremented (note the semicolon after the for loop).

120. What will be the output?

```
main()
{c
har *p;
p="%d\n";
p++;
p++;
```

```
printf(p-2,300);
}
```
Soln:
300
Explanation:
The pointer points to % since it is incremented twice and again decremented by 2, it points to '%d\n' and 300 is printed.

121. What will be the output?

```
 main()
{
unsigned int i=10;
while(i-->=0)
printf("%u ",i);
}
```
Soln:
10 9 8 7 6 5 4 3 2 1 0 65535 65534…..
Explanation:
Since i is an unsigned integer it can never become negative. So the expression i-- >=0 will always be true, leading to an infinite loop.

122. What will be the output?

```
#include<conio.h>
main()
{
int x,y=2,z,a;
if(x=y%2) z=2;
a=2;
printf("%d %d ",z,x);
}
```
Soln:
Garbage-value 0
Explanation:
The value of y%2 is 0. This value is assigned to x. The condition reduces to if (x) or in other words if(0) and so z goes uninitialized.
Thumb Rule: Check all control paths to write bug free code.

123. What will be the output?

```
 main()
```

```
{
int a[10];
printf("%d",*a+1-*a+3);
}
```
Soln:
4
Explanation:
*a and -*a cancels out. The result is as simple as 1 + 3 = 4 .

124. What will be the output?

```
#define prod(a,b) a*b
main()
{
int x=3,y=4;
printf("%d",prod(x+2,y-1));
}
```
Soln:
10
Explanation:
The macro expands and evaluates to as:
x+2*y-1 => x+(2*y)-1 => 10

125. What are the merits and demerits of array in C?

Soln: Merits:

a) We can easily access each element of array.

(b) Array elements are stored in contiguous memory location.

Demerit:

(a) Wastage of memory space. We cannot change size of array at the run time.

(b) It can store only similar type of data.

Data Structure

1. What is data structure?

Soln: Data Structure is representation of logical relationship existing between individual elements of data.

Data structures Algorithm=Program

2. List out areas in which data structures are applied extensively.

Soln:
1. Compiler Design
2. Operating System
3. Database Management System,
4. Statistical Analysis Package
5. Numerical Analysis
6. Graphics
7. Artificial Intelligence
8. Simulation

3. What are the major data structures used in the following areas : RDBMS, Network data model and Hierarchical data model.

Soln:
1. RDBMS = Array (i.e. Array of structures)
2. Network data model = Graph
3. Hierarchical data model = Trees

4. List out few of the Application of tree data-structure?

Soln:
1. The manipulation of Arithmetic expression,
2. Symbol Table construction,
3. Syntax analysis.

5. **What is the difference between a Stack and an Array?**

Soln: The differences between array and stack are

1) Stack is dynamic object whose size is constantly changing as items are pushed and popped whereas array is a static object.

2) Array contains same data types whereas stack contains different data types

6. What do you mean by free pool?

Soln: Pool is a list consisting of unused memory cells which has its pointer.

7. What is the difference between array and stack?

Soln: The differences between array and stack are

i) Stack follows LIFO.The element which is entered last will be removed first whereas in array items can be entered or removed in any order.Basically each member access is done using index.

ii) Stack is a dynamic object whose size is constantly changing as items are pushed and popped whereas array is a static object.

iii) Stack may contain different data types where array contains same data types.

8. Whether linked list is linear or nonlinear data structure?

Soln: According to access strategies linked list is a linear data structure according to storage linked list is a non linear data structure.

9. What are the differences between stack and heap memory?

Soln: The differences between stack and heap memory are

1) one of the big difference between stack and heap is size.Stack size is fixed i.e we get overflow error, whereas heap size is operated by the OS and can be changed according to needs.

2) Stack is much faster than heap.Since in stack memory allocation is easy and moving the stack pointer up.

3) For programming purpose it is better to use stack because it is easier to allocate memory on stack.If size of data is small use stack otherwise use heap.

10. What is the difference between sorting and searching?

Soln:Sorting is the process of arranging elements in a particular order whereas searching is the process of finding the desired record in a search table.

11. What is the difference between internal sorting and external sorting?

Soln: In internal sorting all the records to be sorted are present in the main memory.This type of sorting is used when the list does not contain a large number of elements whereas in external sorting it is not possible to store all the records in the main memory of the computer.They are stored on devices such as disks and tapes.Then they are brought into the memory part by part and sorted.The final list is in sorted order.

12. What are the differences between linked list and array?

Soln:

Linked List	**Array**
1. The linked list is collection of nodes.	1.The array is a

Each node structure is having one data field and one next link field.	collection of similar types of elements.
2. Any element can be accessed by a sequential access only.	2. Any element can be accessed randomly i.e with the help of index of the array.
3. Insertions and deletions of the data is easy.	3. Insertions and deletions of the data is difficult.
4. The memory allocation is dynamic So the developer can allocate as well as deallocate the memory and so no wastage of memory is there.	4. The memory allocation is static.So once the fixed amount of size is declared, that much memory is allocated.So there is a chance of either memory wastage or memory shortage.

13. What is minimum spanning tree?

Soln: A spanning tree is a tree associated with a network.All the nodes of the graph appear on the tree once.A minimum spanning tree is a spanning organized so that the total edge weight between nodes is minimized.

14. What is the difference between algorithm and program?

Soln: Algorithm is a finite set of step by step instructions how to solve a problem whereas program is an implemented coding of a solution to a problem based on the algorithm.

15. What is red black tree?

Soln: A red black tree is a binary search tree which has the following red black properties.

1. Every node is either red or black.
2. The root is black.
3. Every leaf is black.
4. If a node is red, then both its children are black.
5. All internal nodes have two children.
6. Every simple path from a node to a descendant leaf contains the same number of black nodes.

16. What are the applications of queue?

Soln: The applications of queue are-

i) Round robin technique for processor scheduling is implemented using queue.

ii) Printer server routines are designed using queue.

iii) All types of customer service software(Like railway/Air ticket reservation) are designed using queue to give proper service to the customer.

17. What is the difference between time complexity and space complexity?

Soln: Time complexity of an algorithm or program is the amount of time it needs to run to completion whereas space complexity is the amount of memory it needs to run to completion.

18. What is Big "OH" Notation?

Soln: Big oh is a characteristics scheme that measures properties of algorithm complexity performance and/or memory requirements.It is the method of determining the upper bound of algorithm's running time.

19. What is binary search tree?

Soln: A binary search tree is a binary tree which is either empty or satisfies the following rules.
1. The value of the key in the left child or left subtree is less than the value of the root.
2. The value of the key in the right child or right subtree is greater than or equal to the value of the root.

20. What is binary tree?
Soln: A binary tree is a finite set of data items which is either empty or consists of a single item called root and two distinct subtrees called the left subtree and right subtree.
A binary tree is very important and most commonly used non linear data structure.

21. What is linked list?
Soln: There is a special data structure called linked list that provides most flexible storage system and it does not require the use of arrays.

22. What are the advantages and disadvantages of linked list?
Soln: **Advantages-**

i) **Linked lists are dynamic data structure-** They can grow or shrink during the execution of a program.

ii) Efficient memory utilization- Memory is not pre-allocated.Memory is allocated whenever it is required and it is deallocated when it is no longer needed.

iii) insertions and deletions are easier and efficient- linked list provides flexibility in inserting a data item at a specified position and deletion of a data item from the given position.

iv) many complex problems can be easily carried with linked list.

Disadvantages-

i) More Memory-if number of fields are more then more

memory space is needed.

ii) It is time consuming.

23. What are the advantages and disadvantages of circular linked list?

Soln: **Advantages-**

i) Nodes can be accessed easily.

ii) Deletion of node is easier.

iii) Concatenation and spiliting of circular linked list are more efficient.

Disadvantages-

i) It may enter infinite loop.

ii) Head node is required to indicate the start or end of the circular linked list.

iii) Backward traversing is not possible.

24. What is heap sort?

Soln: Heap sort is a sort that uses binary tree concept such that any number is larger than all the numbers in the subtree below.

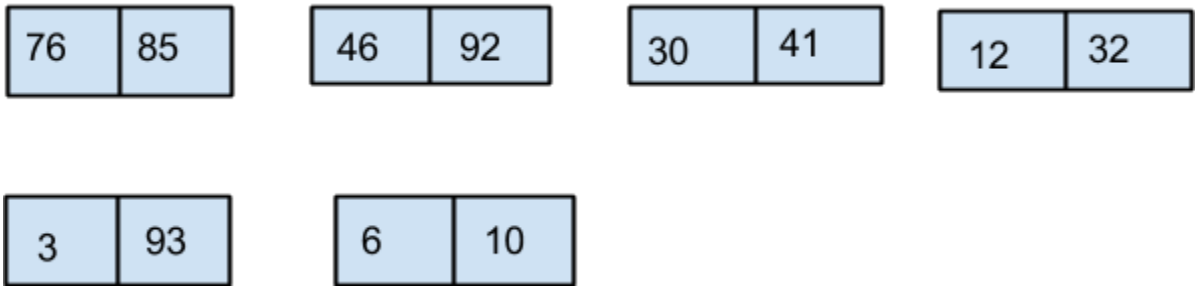
25. What is merge sort?

Soln: Merge sort is a sorting technique which divides the array into subarrays of size 2 and merge adjacent pairs.

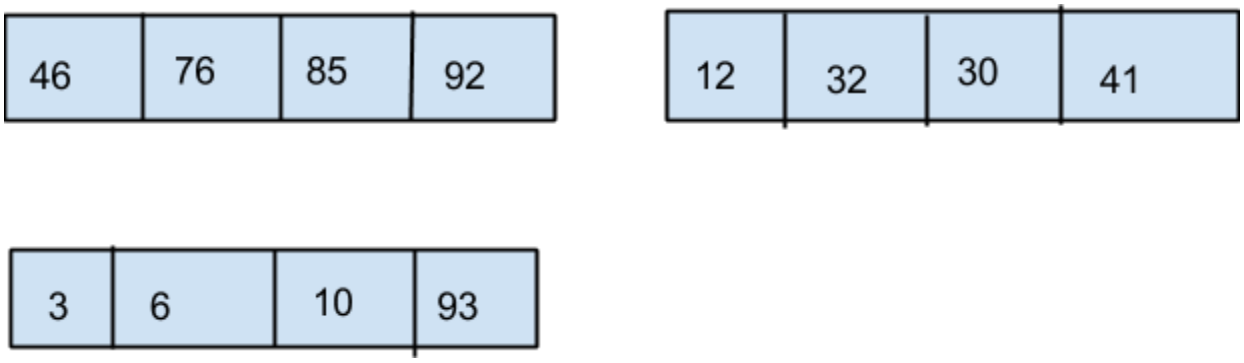
For Example-

85,76,46,92,30,41,12,32,93,3,6,10

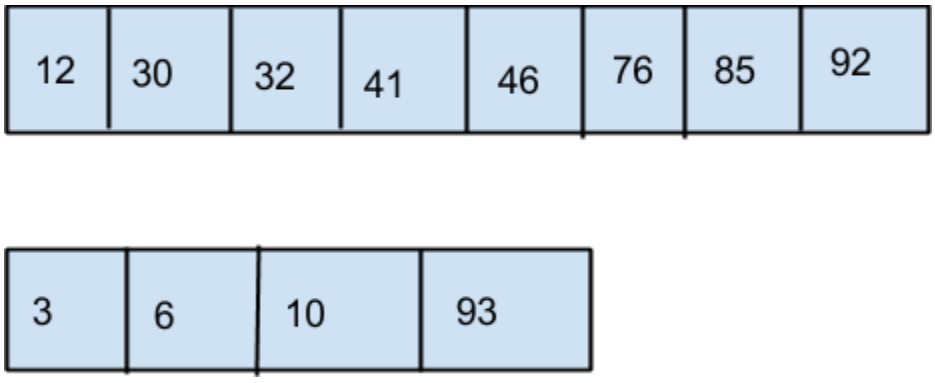
Pass-I



Pass-II



Pass-III



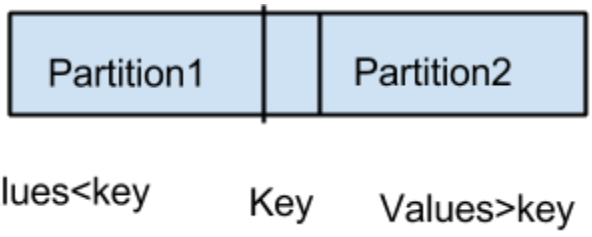
Pass-IV

3	6	10	12	30	32	41	46	76	85	92	93

26.What is the difference between linear search and binary search?
Soln:

Linear Search	Binary Search
1. It takes place in unsorted array.	1. It takes place in sorted array
2. It takes more time if the size of an array is large.	2. It takes less time.

27. What is quick sort?
Soln: Quick sort possesess a very good average case behavior among all the sorting techniques.It is one of the most popular sorting techniques.Quick sort algorithm works by partitioning the array to be sorted.each partition is sorted recursively.In partition,one of the array elements is chosen as a key value.The key value can be the first element of the array.
One partition contains elements smaller than the key value.
Another partition contains elements larger than the key value.



28. What is bubble sort?
Soln: In bubble sort,each element is compared with its adjacent element.If the first element is larger than the second one then the position of the elements are interchanged.Otherwise it is not

changed.Then the next element is compared with its adjacent element and the same process is repeated for all the elements in the array.

29. What are the uses of heap?
Soln: **Uses of heap-**
i) A heap is useful in implementing priority queues
ii) A heap can be used to sort a set of elements.

30. Why stack is called LIFO?
Soln: All the deletion and insertion in a stack is done from the top of the stack,the last added element will be the first to be removed from the stack.That is why the stack is called Last in First out(LIFO) type of list.

31. What is selection sort?
Soln: Selection sort algorithm find the smallest element of the array and interchanges it with the element in the first position of the array.Then it finds the second smallest element from the remaining elements in the array and places it in the second position of the array and so on.

32. Why merge sort is external sort algorithm?
Soln: Merge sort is an external sort algorithm that needs extra memory or storage space.It is used for sorting data in huge files.

33. What is splay tree?
Soln: A splay tree is a self adjusting binary search tree.These trees have wonderful property to adjust optimally to any sequence of tree operations.There are six different splaying steps: zig rotation(Right rotation),zag rotation(left rotation),zig-zag(zig followed by zag),zag-zig (zag followed by zig),zig-zig and zag-zag.

34. What is hashing?
Soln: Hashing is a technique where we compute the location of the

desired record in order to retrieve it in a single access.

35. What is hash collision?

Soln: It is possible that two non identical keys are hashed into the same hash address.This situation is called hash collision.

36. What is balanced binary tree?

Soln: A balanced binary tree is one in which the largest path through the left subtree is the same length as the largest path through the right tree i.e from root to leaf.Searching time is very less in balanced binary trees as compared to unbalanced binary trees i.e balanced trees are used to maximize the efficiency of the operations on the tree.

37. Consider the function defined by f(x)=2x3+3x2+1 show that f(x)=O(x3).

Soln: $f(x)=2x^3+3x^2+1$

$<= 2x^3+3x^3+1x^3$ for all $x>=1$

$<= 6x^3$

There exists c=6 and k=1 such that $f(x)<=cx^3$ for all $x>=k$

$f(x)=O(x^3)$

38. Use big oh notation to estimate the sum of first n positive integers.

Soln: 1+2+3+ …….. +n<= n+n+.....+n

for every positive integer n — n times

$<= n*n$

$<= n^2$

$=O(n^2)$

39. Consider the function $f(x)=5x^3-3x+4$ and calculate the big oh notation.

Soln: For all real numbers x

$f(x)=5x^3-3x+4$

For all real numbers x>1

$|5x3-3x+4| <= |5x^3|+|3x|+|4|$

$<= 5x^3+3x+4$ [By the triangle inequality]

$<=5x^3+3x^3+4x^3$

$<= 12x^3$

$<=12|x^3|$

$|f(x)| <= c|g(x)|$

for all x>k

c=12 k=1

$f(x) =O(x^3)$

40. What is O notation?

Soln: O notation- It provides asymptotic upper bound for a given function.It is the method of representing the upper bound of algorithm's running time.

Let f(x) and g(x) be two non negative integers.Suppose there exists a positive integer n0 and a positive number M such that for all n>=n0.We have

$|f(x)|<=M|g(x|$

We may write f(x)=O(g(x))

41. What is divide and conquer method?

Soln:The basic idea is to divide the problem into several sub problems beyond which cannot be further subdivided. Then solve the subproblems efficiently and join them together to get the solution for the main problem.

42. Define pre-order traversal?

Soln: Pre-order traversal steps are

i)Process the root node(Root)

ii)Process the left subtree(L)

iii)Process the right subtree(R)

43. Define post-order traversal?

Soln: Post-order traversal steps are

i)Process the left subtree(L)

ii)Process the right subtree(R)

iii)Process the root node(Root)

44. Define in -order traversal?

Soln: The inorder traversal steps are

i)Process the left subtree(L)

ii)Process the root node(Root)

iii)Process the right subtree(R)

45. Whether Linked List is linear or Nonlinear data structure?

Soln:According to Access strategies Linked list is a linear one.
According to Storage Linked List is a Non-linear one

46. When can you tell that a memory leak will occur?

Soln: A memory leak occurs when a program loses the ability to free a block of dynamically allocated memory.

47. Minimum number of queues needed to implement the priority queue?

Soln:Two. One queue is used for actual storing of data and another for storing priorities.

48. In RDBMS, what is the efficient data structure used in the internal storage representation?

Soln:B+ tree. Because in B+ tree, all the data is stored only in leaf nodes, that makes searching easier. This corresponds to the records that shall be stored in leaf nodes.

49. Differentiate file structure from storage structure.

Soln: Basically, the key difference is the memory area that is being accessed. When dealing with the structure that resides the main memory of the computer system, this is referred to as storage structure. When dealing with an auxiliary structure, we refer to it as file structure.

50. What is the data structure used to perform recursion?

Soln: Stack.

51. What is BFS?

Soln: Breadth First Search (BFS) is a general technique for traversing a graph. BFS on a graph with n vertices and m edges takes O(n + m) time.
A BFS traversal of a graph G

1) Visits all the vertices and edges of G
2) Determines whether G is connected
3) Computes the connected components of G
4) Computes a spanning forest of G .

52. What is Depth First Search(BFS)?

Soln:Depth first search is another way of traversing graphs, which is closely related to preorder traversal of a tree. Recall that preorder traversal simply visits each node before its children. It is most easy to program as a recursive routine.

53. What is the difference between internal sorting and external sorting?

Soln: Internal Sorting takes place in the main memory of a computer. The internal sorting methods are applied to small collection of data.The

External sorting methods are applied only when the number of data elements to be sorted is too large. This sorting requires auxiliary storage.

54. Give example of internal and external sorting.
Soln: External sorting- Merge sort
Internal sorting-Bubble sort,Insertion sort,quick sort,heap sort.

55. How many stacks are required to implement a queue?
Soln:Two stacks.

56. How the size of graph is determined?

Soln – It can be determined by number of edges it has.

57. What are the disadvantages of representing a stack or queue by a linked list?

Soln: The disadvantages of representing a stack or queue by a linked list
i) A node in a linked list (info and next field) occupies more storage than a corresponding element in an array.
ii) Additional time spent in managing the available list.

58.Can we apply binary search algorithm to a sorted linked list, why?
Soln: No we cannot apply binary search algorithm to a sorted linked list, since there is no way of indexing the middle element in the list. This is the drawback in using linked list as a data structure.

59. In an AVL tree, at what condition the balancing is to be done?
Soln: If the balance factor of any node is other than 0 or 1 or -1 then balancing is done.

60. What are the major data structures used in Network data model

& Hierarchical data model in RDBMS?
Soln: Network data model – Graph

Hierarchical data model – Trees

61.Complexity of following segment of code is:

```
for(i=n;i>=1;i=i/2)
    for(j=1;j<=i;j++)
    {
      ----------some code
    }
```

Soln: O(nlog n)

62. Which Algorithm is used to sort the subarrays of a merge sort?

Soln: Insertion Sort

63. The pre order traversal of a binary tree is DEBFCA. Find out the pre order traversal.

Soln: ABDECF

Operating System

1.**What is Operating System (OS)?**

Soln: An Operating System (OS) is a system software which realizes the effective utilization of computer system resources both hardware and software with respect to time in a given computer environment and to provide an interface between the user and the hardware so that the user can use the hardware resources to solve their problem.

Operating System is called the overseer and supervisor of all computer activity.

Operating System performs the housekeeping functions.

The term “Operating System” means a set of programs, which controls computer working.

Operating System is a collection of software routines.

The primary job of an Operating System is to manage resources.

The primary purpose of an Operating System is to make the most efficient use of hardware resources.

A computer can not boot if it does not have an Operating System.

2. What are the main functions of the Operating System?

Soln:The main function of the Operating System

1. Process management
2. Memory management
3. Storage/file System management
4. Input/Output management

3. What are the three main purposes of an operating system?

Soln: To provide an environment for a computer user to execute programs on computer hardware in a convenient and efficient manner. To allocate the separate resources of the computer as needed to solve the problem given. The allocation process should be as fair and efficient as possible. As a control program it serves two major functions:

(1) supervision of the execution of user programs to prevent errors and improper use of the computer, and

(2) management of the operation and control of I/O devices.

4. What is the main advantage of multiprogramming?

Soln: Multiprogramming makes efficient use of the CPU by overlapping the demands for the CPU and its I/O devices from various users. It attempts to increase CPU utilization by always having something for the CPU to execute.

5. What are the main differences between operating systems for mainframe computers and personal computers?

Soln: The design goals of operating systems for those machines are quite different. PCs are inexpensive, so wasted resources like CPU cycles are inconsequential. Resources are wasted to improve usability and increase software user interface functionality. Mainframes are the opposite, so resource use is maximized, at the expensive ease of use.

6. What are the important process management function?

Soln: The important process management functions are as follows

1. Creation and deletion of both user and system processes.
2. Suspension and resumption of processes.
3. CPU scheduling (and process accounting)
4. Process synchronization
5. Process communication

7. What are the important memory management functions?

Soln: The important memory management functions are as follows

1. Memory allocation and deallocation.
2. Integrity maintenance (what belongs to whom)
3. Efficient utilization of memory
4. Protection of a program's memory from interference by other programs.
5. Virtual memory
6. Swapping

8. **What are the important file management functions?**

Soln: The important file management functions are as follows

1. Creation and deletion of files.
2. Creation and deletion of directories.
3. Mapping of files onto secondary storage.
4. Backup of files on storage media such as disk, tape etc.
5. Support of primitives for manipulating files and directories.

9. What do you mean by memory management?

Soln: Memory management means management of primary memories. OS responsibility in memory management includes
memory allocation and deallocation, efficient utilization of memory and protection of a program's memory from interference by other programs.

10. What are the three major activities of an operating system in regard to secondary-storage management?
Soln: Free-space management. Storage allocation. Disk scheduling.

11. What is the purpose of the command interpreter? Why is it usually separate from the kernel?
Soln: It reads commands from the user or from a file of commands and executes them, usually by turning them into one or more system calls. It is usually not part of the kernel since the command interpreter is subject to changes.

12. What is the purpose of system calls?
Soln: System calls allow user-level processes to request services of the operating system.

13. What is the purpose of system programs?
Soln: System programs can be thought of as bundles of useful system calls. They provide basic functionality to users and so users do not need to write their own programs to solve common problems.

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16. What are the main advantages of the microkernel approach to

system design?

Soln: Benefits typically include the following (a) adding a new service does not require modifying the kernel, (b) it is more secure as more operations are done in user mode than in kernel mode, and (c) a simpler kernel design and functionality typically results in a more reliable operating system.

17. Explain the difference between internal and external fragmentation.

Soln: Internal Fragmentation is the area in a region or a page that is not used by the job occupying that region or page. This space is unavailable for use by the system until that job is finished and the page or region is released.

18. Describe the following allocation algorithms:

a. First fit

b. Best fit

c. Worst fit

Soln:

a. First-fit: search the list of available memory and allocate the first block that is big enough.

b. Best-fit: search the entire list of available memory and allocate the smallest block that is big enough.

c. Worst-fit: search the entire list of available memory and allocate the largest block. (The justification for this scheme is that the leftover block produced would be larger and potentially more useful than that produced by the best-fit approach.)

19. Why are page sizes always powers of 2?

Soln: Recall that paging is implemented by breaking up an address into a page and offset number. It is most efficient to break the address into X page bits and Y offset bits, rather than perform arithmetic on the address to calculate the page number and offset. Because each bit position represents a power of 2, splitting an address between bits

results in a page size that is a power of 2.

20. Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.

a. How many bits are there in the logical address?

b. How many bits are there in the physical address?

Soln:

a. Logical address: 13 bits

b. Physical address: 15 bits

21. Consider a paging system with the page table stored in memory.

a. If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?

b. If we add associative registers, and 75 percent of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes zero time, if the entry is there.)

Soln:

a. 400 nanoseconds; 200 nanoseconds to access the page table and 200 nanoseconds to access the word in memory.

b. Effective access time = 0.75 (200 nanoseconds) + 0.25 (400 nanoseconds) = 250 nanoseconds.

22. Why are segmentation and paging sometimes combined into one scheme?

Soln: Segmentation and paging are often combined in order to improve upon each other. Segmented paging is helpful when the page table becomes very large. A large contiguous section of the page table that is unused can be collapsed into a single segment table entry with a

page-table address of zero. Paged segmentation handles the case of having very long segments that require a lot of time for allocation. By paging the segments, we reduce wasted memory due to external fragmentation as well as simplify the allocation.

23. What is bootstrap loader?

Soln: When a computer is first turned on and restarted a special type of absolute loader is executed called a bootstrap loader.

24. What is virtual memory?

Soln: Virtual memory is a technique to allow large logical address space to be mapped onto a smaller physical memory. Virtual memory allows extremely large processes to be run and also allows the degree of multiprogramming to be raised, increasing CPU utilization. Further it frees application programmers from worrying about memory availability. Virtual memory is a technique that allows the execution of processes that may not be completely in memory.

Virtual memory refers to the technology in which some space in hard disk is used as an extension of main memory so that a user program need not worry if its size extends the size of main memory.

The main visible advantage of this scheme is that logical memory can be larger than physical memory.

The size of the virtual memory depends on the size of the address bus.

25. What are the advantages of Virtual memory?

Soln: The advantages of virtual memory

1. Virtual memory allows each program to exceed the size of the primary memory.
2. Virtual memory increases the degree of multiprogramming.
3. Virtual memory reduces the context switching overhead.

26. **What is process?**

Soln: A process is a program in execution. The execution of a process must progress in a sequential fashion. That is, at any time at most one instruction is executed on behalf of the process.

27. **What is task?**

Soln: The running state of a program is called process or task.

28. **What are the differences between program and process?**

Soln: A program is a passive entity which specifies the logic of data manipulation and I/O actions. A program does not perform the actions by itself; it has to be executed to realize the actions whereas a process is an active entity which performs the actions specified in a program.

29. What are the different process states?

Soln: As a process executes it changes states. The state of a process is defined by the current activity of that process.

1. New- The process is being created.
2. Running- Instructions are being executed.
3. Waiting- The process is waiting for an event (such as an I/O completion or reception of a signal).
4. Ready- The process is waiting to be assigned to a processor.
5. Terminated- The process has finished its execution.

30. What is Process Control Block (PCB)?

Soln: Each process in the operating system is represented by a Process Control Block (PCB)- also called a Task Control Block. It stores important internal data like process ID, process state, program counter, CPU registers, CPU scheduling information, memory management information, accounting information, I/O status information.

31. Why process synchronization is needed?

Soln: In multiprogramming system some processes perform read and some processes perform write operation on the file simultaneously. This would lead to data inconsistency, as data is being read as well as modified by many processes at the same time. To prevent such data inconsistency process synchronization is needed.

32. What are the differences between threads and processes?

Soln:The differences between threads and processes are

1) Threads share the address space of the process that created it; processes have their own address space.

2) Threads have direct access to the data segment of its process; processes have their own copy of data segment of the parent process.

3) Threads can directly communicate with other threads of its process; processes must use interprocess communication mechanisms (Pipes, FIFOs, Sockets).

4) In comparison to threads processes have considerable overhead from the systems perspective. New threads are easily created; new processes require duplication of the parent process.

33. What are the advantages of using threads?

Soln: **Advantages**

1) Less system resources required for thread context switching.

2) Increased throughput of an application.

3) No special mechanism required for communication between threads.

4) Program structure is more readable and simplified.

34. What are the disadvantages of using thread?

Soln: Disadvantages

1) Require synchronization for concurrent read write access to memory.

2) Can easily corrupt the address space of its process.

3) Threads exist only within a single process and are therefore not reusable.

35. What is concurrency control?

Soln:Concurrency Control is a method used to ensure that processes are executed in a safe manner without affecting each other and correct results are generated while getting those results as quickly as possible.

36. What is zombie?

Soln: If a child dies before its parent calls wait, the child becomes a zombie.

38. What is critical section?

Soln: A critical section is a section where processes access the shareable modifiable data. Only one process is allowed to enter in its critical section. When many processes try to access the same data item then this feature sequentialized all such requests and executes them one by one. This is called storage interlock and is a hardware feature of shared memory.

A critical section for a data item is a section of code which should not be executed with itself.

39. What is critical region?

Soln: The critical region is a control structure for data access synchronization. It is used implement mutual exclusion over a shared variable.

40. What is kernel?

Soln: The part of the OS which handles all the details of sharing resources and device handling is the kernel (Core OS). The kernel is not something which can be accessed directly. The kernel services can be accessed through system calls. A User Interface or Command Line Interface (CLI) allows user to log onto the machine, manipulate files, compile programs and executes them using simple commands. Since this

a layer of the software which wraps the kernel. It is called a shell around the kernel.

41. What is interrupt?

Soln: An interrupt is a signal from a device that typically results in a context switch. Asynchronous events are signaled to the processor via interrupts. An Interrupt Handler or Interrupt Service Routine is written to handle the interrupts. Examples of typical interrupts are timer interrupts, disk interrupts, power off interrupts and traps.

42. What is Spooling?

Soln: Spooling which is a short form of Simultaneous Peripheral Operation On line, is a technique to avoid the use of slow I/O devices in a computer system.

An example of a spooled device is a line printer used to print number of jobs.

43. What is cache?

Soln: Cache is a special high speed storage mechanism. It can either be a reserved section of main memory or an independent high speed storage mechanism. It serves as an intermediate temporary storage unit logically positioned between the registers and RAM. Cache is a region of fast memory that holds copies of data. Cache memory is also a RAM but faster than RAM. Cache memory is volatile because its contents are erased on each power off. Cache is used to hold the active portions of programs and data that is mostly used.

44. **What is swapping?**

Soln: Swapping is a technique of temporarily removing inactive programs from the memory of a computer system. The programs existing in the memory are classified into three categories.

1. **Active programs-** one active program executes on the CPU while others perform I/O.

2. Programs being swapped out of memory.
3. Programs being swapped into the memory.
Moving process from main memory to disk is known as swapping.

45. What is scheduling?

Soln: Scheduling is the activity of determining which service requests should be handled next by a server. In an Operating System (OS) CPU of the computer is the server and user jobs are the service requests.

46. What are the differences between preemptive and nonpreemptive scheduling?

Soln: Preemptive scheduling allows a process to be interrupted in the midst of its execution, taking the CPU away from it and allocating it to another process.
Non preemptive scheduling ensures that a process relinquishes the control of the CPU only when it finishes with its current burst of execution.
Non preemptive scheduling is rarely used in a computer, especially in a time sharing system because it does not guarantee that each user gets a share of the CPU at regular intervals. The non
preemptiveness allows programs to run indefinitely long thus making other processes wait longer or indefinitely.

47. What are the aims of process scheduling?

Soln: The aims of process scheduling are
1. Large throughput i.e. low average waiting time.
2. Waiting time should be as small as possible.
3. Predictability.
4. There should not be indefinite postponement i.e. all jobs should get an opportunity to run.

48. Define Multiprocessing?

Soln: Several processors are used on a single computer system to increase the processing speed of the machine. The coordinated processing of programs on such a computer system is multiprocessing. Commonly deployed in network server or client/server applications.

49. Define Multiprogramming?

Soln: Several processes (programs) are in memory concurrently and in state of execution. The system switches among the programs for efficient processing (CPU usage) and minimal idle time (I/O delays). Multiprogramming is a rudimentary form of processing in which several programs run at the same time on a uni-processor. Multiprogramming Operating System enforces concurrency control where processes access shared I/O devices and files.

50. What is throughput?

Soln: The throughput of a system is the number of programs processed by the system per unit time.

51. Define single tasking and multi tasking operating system?

Soln: **Single tasking-** The ability of an Operating System to execute one task (a task being a program) at one particular instance of time is called single tasking.

Multitasking- The ability of an Operating System to execute more than one task (a task being a program) at one particular instance of time is multitasking. In multitasking one CPU is involved but it switches from one program to another so quickly it gives the appearance of executing all of the programs at the same time.

52. **Define single user and multi-user Operating System?**

Soln: **Single user-** When a single user accesses computer resources i.e. CPU, RAM at one particular instance of time then the underlying

Operating System is called a single user Operating System.

Multi user– When multiple users share one common resources of computer i.e. CPU, RAM etc at one particular instance of time then the underlying Operating System is called Multi user Operating System.

53. What is deadlock?

Soln: A deadlock is a state when all processes are in wait queue waiting for an event to occur. This is an unwanted situation. Deadlock is an unsafe state.

A process is said to be in deadlock state if it is waiting for an event that will never occur.

A deadlock state occurs when two or more processes are waiting indefinitely for an event that can be caused only by one of waiting processes.

54. What is mutual exclusion?

Soln: Mutual exclusion is a way of making sure that if one process is using a shared modifiable data, the other processes will be excluded from doing the same thing.

55. What are the necessary conditions for deadlock?

Soln: Conditions for deadlock

1. **Mutual exclusion condition-** Each resource is currently assigned to exactly one process or is available.
2. **Hold and wait condition-** Processes currently holding resources granted earlier can request new resources.
3. **No preemption condition-** Resources previously granted can not be forcibly taken away from a process. They must be explicitly released by the process holding them.
4. **Circular wait condition-** There must be a circular chain of two

or more processes. Each of which is waiting for a response held by the next member of the chain.

All four of these conditions must be present for a deadlock to occur. If one of them is absent no deadlock is possible.

56. What is Livelock?

Soln:This is a situation in which two processes continuously change their states in response to changes in other process(processes) without doing any useful work.

This is similar to deadlock in that no progress is made but differs in that neither process is blocked nor waiting for anything.

57. What is deadlock prevention?

Soln: Deadlock prevention is a set of methods for ensuring that at least one of the necessary conditions can not hold.

58. What is deadlock avoidance?

Soln: A deadlock avoidance algorithm dynamically examines the resource allocation state to ensure that there can never be a circular wait condition. The resource allocation state is defined by the number of available and allocated resources and the maximum demands of the processes.

59. What is deadlock detection?

Soln: If a system does not employ either a deadlock prevention or a deadlock avoidance algorithm, then a deadlock situation may occur. In this environment the system must provide

1) An algorithm that examines the state of the system to determine whether a deadlock has occurred.

2) An algorithm to recover from the deadlock.

If a deadlock occurs deadlock detection finds out those processes and

resources involved in the deadlock. This will help us to clear the deadlock.

60. What is deadlock recovery?

Soln: These are the methods used to clear the deadlock and let the processes involved in that get executed.

61. What is the difference between deadlock prevention and deadlock avoidance?

Soln: Deadlock avoidance refers to a strategy when whenever a resource is requested it is only guaranteed if it can not result in deadlock.

Deadlock prevention strategy involve changing the rules so that Processes will not make requests that could result in deadlock.

62. What is safe state?

Soln: A system is in a safe state if resources can be allocated to processes in some order without causing a deadlock.

63. What is resource allocation state?

Soln: The resource allocation state is defined by

1. Number of available resources.
2. Number of allocated resources.
3. Maximum demands of processes.

64. What is starvation?

Soln: A situation in which processes have to wait indefinitely.

65. What is aging?

Soln: A solution to the problem of indefinite blockage of low priority processes is aging. Aging is a technique of gradually increasing priority of processes that wait in the system for a long time.

66. What is system call?

Soln: System call is a method by which a program makes a request to the OS. System call can provide an interface to a running program and OS.

67. What are the advantages and disadvantages of multiprogramming?

Soln: **The advantages of multiprogramming**

1. Increased throughput.
2. Shorter response time.
3. Ability to assign priorities to jobs.

The disadvantages of multiprogramming

1. Decreased Operating System overhead.

68. What is the objective of multiprogramming?

Soln: The objective of multiprogramming is to have some process running to all times, to maximize CPU utilization.

69. What is the objective of time sharing Operating System?

Soln: The objective time sharing is switch the CPU among processes so frequently that user can interact with each program while it is running.

70. What is demand paging?

Soln: In virtual memory system demand paging is the act of transferring pages between physical memory and backing store (usually disk) as and when they are needed. Processes reside on secondary storage. Whenever a process is executed its pages are loaded into memory from the backing store. A page is brought into memory only if the page is required (demanded).

Demand loading of pages is called demand paging. VM handler loads

only one page of a program to start with. This is the page that contains the execution start address of the program. Every other page is loaded on demand i.e. when it is referenced.

71. What is memory fragmentation?

Soln: Fragmentation means splitting. Memory fragmentation is the existence of unusual memory areas in a computer system.
A common problem that occurs with dynamic partition allocation is fragmentation of memory. As processes are loaded and removed from memory the free space is broken into small pieces. This is called fragmentation.
In memory management, fragmentation problem is caused by creation of large number of free holes.

72. What is Internal fragmentation?

Soln: Internal fragmentation arises when the memory allocated to a program is not fully utilized by it. This space is unavailable for use by the system until that process releases the segment.

73. What is external fragmentation?

Soln: External fragmentation arises when free memory areas existing in the system are too small to be allocated to programs.
When total memory space available to satisfy the requirement of the process is not contiguous, it is called external fragmentation. The solution to the problem of external fragmentation is compaction. The available space memory is collected and organized as one large block. Compaction is possible only if relocation is dynamic and is done at execution time.

74. What is paging?

Soln: Paging is a memory management scheme that permits the physical address space of a process to be non contiguous.

Physical memory is broken into fixed sized blocks called frames. Logical memory is broken into blocks of the same size called pages. When a process is executed its pages are loaded into any available memory fames from the backing store.

75. What is segmentation?

Soln: Segmentation is a memory management scheme that supports the user view of memory. A logical address space is a collection of segments. Each segment has a name and length.

76. What is the difference between CPU burst and I/O burst?

Soln: CPU burst is a time interval when a process uses CPU only whereas I/O burst is a time interval when a process uses I/O devices only.

77. Differentiate between first fit, best fit and worst fit?

Soln: **First fit-** This algorithm searches the list of holes and allocates the first memory area that is large enough.
Best Fit- This algorithm fits the process into the hole that is large enough to hold the process.
Worst fit- This algorithm fits the process into the largest available hole.

78. What is page fault?

Soln: The page fault is an access to a page belonging to another program.

79. What is hit ratio?

Soln: Hit ratio is the percentage of time that a page number is found in the associative register.

80. What is MMU?

Soln: Memory Management Unit (MMU) is a run time mapping from

virtual to physical address. It is a hardware device.

81. What is backing store?

Soln: It is commonly a fast disk. It is required by swapping.

82. What is distributed system?

Soln: A distributed system is a collection of processors that do not share memory or a clock. Instead each processor has its own local memory and the processor can communicate with one another through various communication lines such as high-speed buses or telephone lines. The processor in distributed system may vary in size and function. They may include small microprocessors, workstations, minicomputers and large general-purpose computer system.

A distributed system is a collection of loosely coupled processors interconnected by a communication network.

Advantages:

1) Resource sharing.
2) Reliability.
3) Computation speed up.
4) Communication.
5) Incremental growth.

83. What is page stealing?

Soln: Page stealing is taking page frames from other working sets.

84. What is the difference between binary semaphore and counting semaphore?

Soln: The differences between binary semaphore and counting semaphore are as follows:

1) A binary semaphore is a semaphore that can range over 0 and 1 whereas a counting semaphore can range over an unrestricted domain.

2) A binary semaphore can be simpler to implement than a counting semaphore.
3) Two operations performed on binary semaphore are take and release whereas two operations performed on counting semaphore are wait and signal.
4) A binary semaphore allows one thread to share the resource at a time whereas counting semaphore allows N access at a time.
5) A binary semaphore is a synchronization object that can have only two states whereas a counting semaphore is a synchronization object that can have arbitrarily large number of states. The internal state is defined by a signed integer variable.
6) Binary semaphores have no ownership attribute and can be released by any thread or interrupt handler regardless of who performed last operation whereas in counting semaphore there is no ownership concept because counting semaphore object can be created with an initial counter value as long as it is non negative.

85. What is the difference between paging and segmentation?
Soln: The difference between paging and segmentation
1) A page is a continuous range of memory addresses which is mapped to physical address whereas a segment is an independent address space. Each segment has addresses in a range from zero to maximum.
2) In paging there is only one linear address space while in segmentation there are many address spaces.
3) In paging programmer does not know that it is implemented while in segmentation programmer knows that it is implemented.
4) In paging procedures and data can not be separated whereas in segmentation procedures and data can be separated
5) In paging procedures can not be shared between users while in segmentation procedures can be shared between users.
6) In paging procedures can not be protected separately whereas in segmentation procedures can be protected separately.
7) In paging compilation can not be done separately while in

segmentation compilation can be done separately.
8) A page is a physical unit whereas a segment is a logical unit.
9) A page is of fixed size while a segment is of arbitary .

86. What is the difference between semaphore and mutex?
Soln:The difference between mutex and semaphore
1) Mutex can be released only by thread that had acquired it while you can signal semaphore from any other thread (or process).
2) Semaphore synchronizes processes whereas mutex synchronizes threads running in the same process.

87. What will be the number of processes that may be simultaneously inside their critical section to avoid the race condition?
Soln: one

88. **How many processes which are sharing common data, the Dekker's algorithm implements mutual exclusion?**
Soln: Three

89. What is Page-map table?
Soln: Page-map table is used for address translation

90. What is Medium term scheduler?
Soln: The scheduler which selects processes from secondary storage device is called Medium term scheduler.

91. What is Page-traffic?
Soln: Page-traffic is the movement of pages in and out of memory.

92. What is Blocking-factor of a file?
Soln: Blocking-factor is the number of logical records in one physical record.

93. An operating system contains 3 user processes each requiring 2 units of resource R. What is the minimum number of units of R such that no deadlocks will ever arise?
Soln: 4

94. What is Long-term scheduling?
Soln: Jobs which are admitted to the system for processing is called **Long-term scheduling.**

95. What SSTF stands for?
Soln: Shortest-Seek-time-first scheduling

96. What is Latency Time?
Soln: Latency Time is the time required by a sector to reach below read/write head.

97. What are two differences between user-level threads and kernel-level threads? Under What circumstances is one type better than the other?
Answer: (1) User-level threads are unknown by the kernel, whereas the kernel is aware of kernel threads. (2) User threads are scheduled by the thread library and the kernel schedules kernel threads. (3) Kernel threads need not be associated with a process whereas every user thread belongs to a process.

98.What resources are used when a thread is created? How do they differ from those used when a process is created?

Soln: Because a thread is smaller than a process, thread creation

typically uses fewer resources than process creation. Creating a process requires allocating a process control
block (PCB), a rather large data structure. The PCB includes a memory map, list of open files, and environment variables. Allocating and managing the memory map is typically the most time-consuming activity. Creating either a user or kernel thread involves allocating a small data structure to hold a register set, stack, and priority.

99.What is orphan process?

Soln:An orphan process is a computer process whose parent process has finished or terminated, though it remains
running itself.In a Unix-like operating system any orphaned process will be immediately adopted by the special init system process. This operation is called re-parenting and occurs automatically.

100. What is the difference between orphan process and zombie process?

Soln: If the child process is dead but its parent process is alive, the child process is declared zombie, means if you run ps aux, you will see that the just died child process is having a Z in the STAT column. If parent process is dead but its child process is alive, the child process is declared orphan, means it is now adopted by its new parent .. the init process.

An orphan process is a process that is still executing,
but whose parent has died. They do not become
zombie processes; instead,
they are adopted by init (process ID 1), which waits on its

children.

What is daemon process?
Soln: If the child process is dead but its parent process is alive, the child process is declared zombie, means if you run ps aux,you will see that the just died child process is having a Z in the STAT column.

101. What is daemon process?
Soln: A daemon is a computer program that runs as a background process, rather than being under the direct control of an interactive user.

102. What is parent and child process?
Soln: The process that invoked fork is the parent process and the newly-created process is the child process.
Every process (except process 0) has one parent process, but can have many child processes.

103. Why touch command is used in UNIX?
Soln: touch command is used for two purposes.
1) It is used for creating empty files.
2) It is used for modifying the last access or last modification time of a given file.

104. Why cat command is used?
Soln: cat command is used for creating and displaying files.
for creating file

cat >ram
A >.....
……..
ctrl-d
for displaying file
cat foo

105. What are the disadvantages of context switching?

Soln: Time taken for switching from one process to other is pure overhead. Because the system does no useful work while switching. So one of the solutions is to go for threading whenever possible.

106. Difference between Logical and Physical Address Space?

Soln: The concept of a logical address space that is bound to a separate physical address space is central to proper memory management. Logical address generated by the CPU; also referred to as virtual address. Physical address seen by the memory unit. Logical and physical addresses are the same in compile-time and load-time address-binding schemes; logical (virtual) and physical addresses differ in execution-time address-binding scheme.

107.What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

Soln: Thrashing is caused by underallocation of the minimum number of pages required by a process, forcing it to continuously page fault. The system can detect thrashing by evaluating the level of CPU utilization as compared to the level of multiprogramming. It can be eliminated by reducing the level of multiprogramming.

108.What is a file?

Soln: A named collection of related data defined by the creator,

recorded on secondary storage.

109.What is a sequential file?
Soln: A file that is read one record or block or parameter at a time in order, based on a tape model of a file.

110.What is direct access file?
Soln: A file in which any record or block can be read next. Usually the blocks are fixed length.

111.Can a direct access file be read sequentially? Explain.
Soln: Yes. Keep a counter, cp, initially set to 0. After reading record cp, increment cp.

112.How can an index file be used to speed up the access in direct-access files?
Soln: Have an index in memory; the index gives the key and the disk location of its corresponding record. Scan the index to find the record you want, and then access it directly.

113.What is the MFD? UFD? How are they related?
Answer: MFD is master-file directory,which points to the UFDs. UFD is user-file directory,which points to each of user's files.

114. List of basic unix command.
ls-- Lists the names of files in a particular UNIX directory.
Example: ls
Result: Lists the names of files in your default directory, in alphabetical order.
Example: ls -l
Result: Gives a "long listing" of the files in your directory. In addition to the file name, the long listing shows protection information, file owner, number of characters in file, and the date and time of the last change

to the file.
Example: ls -a
Result: Causes all your files to be listed, including those files that begin with a period (i.e., hidden files).
cp-- Makes copies of your files.
Example: cp fileone filetwo
Result: Copies the contents of fileone to a file named filetwo. Two separate files now exist.
rm-- Deletes specific files.
Example: rm newfile
Result: Deletes the file named “newfile”.
Example: rm newfile oldfile
Result: Deletes two files -- “newfile” and “oldfile”.
Example: rm new*
Result: Deletes all files that begin with the prefix new.
mv-- This command changes the identification (name) of one or more files.
Example: mv oldfile newfile
Result: Changes the name of the file “oldfile” to “newfile”. Only one file will exist.

The date command tells the system to print the date and time:
$ date
Sat Jul 20 14:42:56 EDT 2002

The who command can be used to get information about all users currently logged in to the system:
$ who

pat tty29 Jul 19 14:40

ruth tty37 Jul 19 10:54

steve tty25 Jul 19 15:52

The who command also can be used to get information about yourself:
$ who am i

pat tty29 Jul 19 14:40

The echo command prints (or echoes) at the terminal whatever else you happen to type on the line (there are some exceptions to this that you'll learn about later):
$ echo this is a test

this is a test

115. What is disk interleaving?
Soln: In disk storage and drum memory, **interleaving** is a technique used to improve access performance to storage by putting data accessed sequentially into non-sequential sectors.

116. What is the purpose of system calls?
Soln: System calls allow user-level processes to request services of the operating system.

117. What is resident set and working set of a process?
Soln: Resident set is the portion of the process image that is actually in real memory at a particular instant.Working set is that subset of resident set that is actually needed for execution.

118. Give a non-computer example of preemptive and nonpreemptive scheduling?

Soln:The non-computer examples for preemptive scheduling the traffic on the single lane road if there is emergency or there is an ambulance on the road the other vehicles give path to the vehicles that are in need. The example for preemptive scheduling is people standing in queue for tickets.

119. What is the command to list down all running process on unix?

Soln: ps -ef

120.What are the different operating systems?

Soln: The different Operating systems are-

1) Batched operating systems
2) Multiprogrammed operating systems
3) Timesharing operating systems
4) Distributed operating systems
5) Real-time operating systems

Networking

1.What is network?
Soln: Network is an interconnection of computers that work within a net.

2. What is networking?
Soln: The linking of computers with a communication system is called networking.

3. What is network topology?
Soln: The physical arrangement of a network is called topology.

4. What do you mean by link and node?
Soln: A network can consist of two or more computers directly connected by some physical medium such as coaxial cable or optical fiber.Such a physical medium is called as links and the computer it connects is called as nodes.

5. Define Network administrator?
Soln: Network administrator is a person responsible for managing the activities on a network and maintains its efficiency under various conditions.

6. What is Proxy Server?
Soln: A Proxy Server is an intermediary computer that is between the user's computer and the Internet. It can be used to log Internet usage and also to block access to a website. The Firewall at the Proxy Server blocks some websites or web pages for various reasons. As a result you are unable to download Java Runtime Environment (JRE) or to run some Java applets.

7. What is network bandwidth?
Soln: The bandwidth of a network is the amount of data that can be transmitted over a particular segment of a network within a specified amount of time usually measured in kilo/mega bits per second (Kbps/Mbps).

8. What do you mean by load on a network?
Soln: The load on a network denotes the total number of users using the resources of the network at a time. It determines the overall network activity and performance speeds.

9. What is packet in a network?
Soln: A packet is a block of data that carries information with it.

10. What is Protocol?
Soln: When two devices in a network want to communicate, they should know a common language for communication. The common language that provides rules and regulations for their communication is known as protocol.

11. What is Internet protocol (IP)?
Soln: Internet Protocol (IP) provides unreliable, connectionless delivery of datagram. IP is the Internet's most basic protocol.

12. What is Internet Service Provider?
Soln: An Internet Service Provider is an organization that sells Internet access.

13. What are the benefits of Proxy Server?
Soln:The benefits of Proxy Server
1) Acts as a Firewall and content filter.
2) Improve Performance.

14. What is MAC address?

Soln: A MAC address or Media Access Control is a 48 bits or 64 bits address associated with a network adapter. While IP addresses are associated with software. MAC addresses are linked to the hardware of network adapters.

15. What is Firewall?

Soln: In terms of Computer Security Firewall is a piece of software. This software monitors the network traffic. A Firewall has a set of rules which are applied to each packet.

A Network Firewall protects a computer network from unauthorized access. Network Firewalls may be hardware devices, software programs or a combination of both. Firewalls can provide a secure connection between two networks. This is called tunneling.

Network Firewalls guard an internal computer network against malicious access from the outside. Another common form of Network Firewall is a Proxy Server.

16. What is the main function of Firewall?

Soln: Filtering is one of the most important functions of a firewall. Conceptually the firewall has two barriers. The outer barrier filters all incoming traffic and the inner barrier filters all outgoing traffic.

17. What is Mesh Topology?

Soln: A Mesh Topology is made up of a network where each device has a point-to-point connection to every other device on the network.

This provides the dedicated capacity of point-to-point link to each device and significant fault tolerance. However, the complexity and cost make this configuration impractical for networks with a large number of devices.

18. What are the benefits and drawbacks of Mesh Topology?

Soln: **Benefits:** The benefits of this topology is that you have redundancy meaning one host goes down, the whole network remains online because each host has multiple links to the network.
Drawbacks: The drawback is Cost. It is more expensive to run because you have to spend more money on equipment to be able to have multiple links on each host. Another drawback could be administration.

19. What are functions of Router?
Soln: Functions Of Router
1) Restricts broadcasts to the LAN.
2) Acts as the default gateway.
3) Move data between networks.

20. What is Supernetting?
Soln: Supernetting also known as Classless Inter Domain Routing (CIDR) is a way to aggregate multiple Internet addresses of the same class.

21. What is OSI model?
Soln: OSI (Open System Interconnection) deals with connecting open systems that are open for communication with other systems. This model has seven layers and each layer provides service to its upper layer.

22. What are the functions of physical layer?
Soln: Functions Of physical layer
1) Bit by bit or symbol by symbol delivery.
2) Bit synchronization in synchronous serial communication.
3) Start stop signaling and flow control in asynchronous serial communication.
4) Physical signaling sublayer is the portion of physical layer interfaces with the data link layer's Media Access Control (MAC) sub layer, performs character encoding, transmission, reception and decoding.

23. What are the functions of Session Layer?

Soln: Functions of Session Layer

1) Dialogue Control and Token Management are the responsibilities of the Session Layer.

2) It enables users to establish a session between different machines.

24. What are the functions of transport layer?

Soln: The functions of the transport layer are

1) It can provide reliable and unreliable transfer of data between networking devices.

2) It can implement flow control through ready or not ready signal.

3) It sets up and maintains a session connection between two devices.

25. What are the functions of the data link layer?

Soln: The functions of the data link layer

1) Communication with network layer above.

2) Communication with physical layer below.

3) Segmentation of upper datagrams (also called as packet) into frames in sizes that can be handled by a communication hardware.

26. What is the main function of network layer?

Soln: The main function of the network layer is routing packets from the source machine to the destination machine.

27. What is Layer?

Soln: Layer is a completely logical partition of PDU (Protocol Data Unit) process that defines how the information is traveled from one computer to another over the network.

28. What is subnet?

Soln: A subnet is a logical grouping of connected network devices.

29. What is HELLO Protocol?

Soln: The HELLO Protocol uses time instead of distance to determine optimal routing.It is alternative to Routing Information Protocol.

30. What is SLIP?

Soln: It is an acronym for Serial Line Interface Protocol. It is a very simple protocol used for transmission of IP datagrams across a serial line.

31. What is VOIP?

Soln: It is an abbreviation for Voice Over Internet Protocol is a technology that uses IP based network such as Internet or private networks to transmit the voice communication.

32. Name the unique address that is stored on ROM on the the Network Adapter Card.

Soln: MAC (Media Access Control) address.

33. Which layers are user support layers?

Soln: The user support layers are

1) Session layer
2) Presentation layer
3) Application layer

34. Which layer links user support layers and network support layers?

Soln: Transport layer links user support layer and network support layers.

35. What are the differences between OSI reference model and TCP reference model?

Soln

OSI reference Model	TCP reference Model
1. It has seven layers	1. It has four layers
2. It distinguishes between service interface and protocol.	2. It did not distinguish clearly between service interface and protocol.
3. First description came and later protocol came.	3. Protocol comes first and description of model later.
4. Supports both connectionless and connection oriented communication in network layer.	4. TCP/IP has only one mode in network layer(connectionless) and supports both modes in transport layer.
5. Protocols are better hidden and can be replaced easily.	5. Protocols are not hidden and can not be replaced easily.

36. What is NOS?

Soln: Network Operating System (NOS) includes the capability for connecting computers and devices to a Local Area Network (LAN).

37. What are the network support layers?

Soln: The network support layers are

1. Physical layer
2. Data link layer

2. Network layer

38. What is Frame Relay technology?
Soln: Frame Relay is a high-speed data communication packet switching technology that operates at the physical and data link layers of the OSI model. Frame Relay uses frames for data transmission in a network.

39. What is gateway?
Soln: A gateway is software or a hardware that is used to connect the Local Area Network with the Internet. A gateway is a network entrance point and a router usually works as a gateway.

40. What is repeater?
Soln: A repeater is an electronic device that operates on only the physical layer of the OSI model.

41. What do you mean by routing?
Soln: Routing refers to the process of identifying a shortest network path to send packets.

42. What is WiFi?
Soln: WiFi or Wireless Fidelity is a base band network technology that is used for the wireless data communication.

43. Why Ping command is used?
Soln: Ping (Packet Internet Grouper) is used to check for a response from another computer on the network.

44. Why NETSTAT command is used?
Soln: NETSTAT is used to look up the various active connections within a computer. It is helpful to understand what computers and networks you are connected to.

45. What are the differences between IP address and MAC address?

Soln: The underlying differences between IP address and MAC address are

1) IP address is a 32 bits address whereas MAC address is 48 bits or 64 bits address.

2) IP address works at the network layer while MAC address works at the data link layer.

3) IP address changes from one network to another while MAC address remains fixed.

4) IP address is associated with software whereas MAC address is linked to the hardware of network adapters.

46. What is subnet mask?

Soln: A subnet mask is a 32 bit number used to inform TCP/IP hosts which bits of the IP address correspond to the network address and which bits correspond to the host address. All bits in a subnet mask that correspond to the network address are set to 1 and all bits corresponding to the host address are set to 0.A bit wise AND operation is performed between the IP address and subnet mask to separate out the network ID and host ID.

47. What is encapsulation?

Soln: Encapsulation is a process of taking data from one protocol and translating it into another protocol so data can continue across a network.

48. What is hub?

Soln: A hub is a multi port signal repeater or concentrator.

49. What is main function of Presentation layer?

Soln: Encrption and decryption of data are the responsibilities of presentation layer.

50. What is NETBIOS?

Soln: NETBIOS is a programming interface that allows I/O requests to be sent to and received from a remote computer and it hides the networking hardware from applications.

51. What do you mean by fragmentation in Networking?

Soln: If the original source packet is too large to be handled by the destination network then the solution is to allow gateways to break up packets into fragments, sending each fragment as a separate internet packet.

52. Why NSLOOKUP command is used?

Soln: NSLOOKUP is an application that facilitates looking up hostnames on the network. It can reveal the IP address of a host or using the IP address return the hostname.

53. What is WINS?

Soln: WINS is an acronym for Windows Internet Naming Service.It converts NETBIOS names to IP addresses on a LAN or WAN.

54. What is Loopback address?

Soln: The IP address 127.0.0.1 is used as the loopback address.This means that it is used by the host computer to send a message back to itself.

It is commonly used for troubleshooting and network testing.

55. What are the differences between a bridge and a switch?

Soln: The differences between a switch and a bridge are

1) A switch supports more ports than a bridge.

2) Bridges switch using software whereas switches switch using hardware(Integrated circuits-ASIC).

3) In switches each indivitual port could be configured for different data

rate.

56. What are the advantages of Client-Server network?

Soln: Advantages of Client-Server network

1. Central location of data enables easier maintenance and management.
2. Security measures like password protection and periodic backup of data are easier to implement.
3. **The total computing load is distributed among the clients and the servers thus allowing the machines work efficiently.**

57. What is Peer-to-Peer network?

Soln: All the computers on the networks acts as peers i.e. they have equal rights and privileges and share information equally. Applications run on each system independently and no single system controls the network.

58. What is star topology?

Soln: Connects all the network devices through a central point usually a server. It provides fault tolerance if one or more clients fail, but stops functioning if the central server fails.

59. Compare IPV6 with IPV4.

Soln: The differences between IPV6 and IPV4 are

1) Larger addresses-IPV6 uses 128 bits instead of 32 bits.
2) Flexible Header Format- Unlike IPV4 where datagram header size is fixed ,IPV6 allows optional headers.
3) Control Information-IPV6 allows user to have control information as part of the datagram.
4) Resource Allocation-Unlike IPV4, IPV6 supports resource pre-allocation by which it guarantees real time video.

60. What is Transmission Control Protocol?

Soln: Transmission Control Protocol(TCP) is a connection oriented communications protocol that provides reliable transfer of data.
Larger messages are broken up and transmitted as segments.
TCP mechanism manages flow and error control and sequencing of packets to guarantee that no data is lost during transmission.
The Transmission Control Protocol (TCP) is responsible for reliable, end-to-end delivery of (segment of information) of a given piece of data.
A segment is the term that is used to describe the data that is transmitted and received at the transport level of the OSI model (i.e. where the TCP resides).
The fields in the TCP header include
1. TCP Source Port (16 bits)- Port number of source applications.
2. TCP Destination Port (16 bits)- Port number of the receiving applications.
3. Sequence Number (32 bits)- Sequence number of the current segment.
4. Acknowledgement Number (32 bits) -Sequence number of the next byte the receiving host expects to receive.
5. Checksum (16 bits)- A checksum to verify the validity of the contents.

61. What is Three Way Handshake in TCP session management?
Soln: TCP is a Connection oriented protocol and requires a session to be opened between hosts that need to communicate.
Establishing a session is a three-step process, called a "three way handshake".
1. The sending host initiates a connection by sending a message to the receiving host.
2. The receiving host responds to the message.
3. The sending host sends its first segment.

62. What is User Datagram protocol (UDP)?
Soln:User Datagram Protocol(UDP) is a connectionless, unreliable protocol that operates at the transport layer of the OSI model. It has no

flow and error control. UDP relies on upper layer protocol for both error correction and reliable service. UDP messages can be lost, duplicated or arrive out of order.
Also packets can arrive at much faster rate than receiver processing rate.It uses port number to multiplex data from the application layer.
The fields in the UDP header include
1. UDP Source Port (16 bits)- Port number of the source application.
2. UDP Destination Port (16 bits)- Port number of the receiving application.
witchi3. Message Length (16 bits)- The total length of the UDP packets.

63. What are the applications of UDP?
Soln: Application of UDP
1. Little concern for flow and error control.
2. Internal flow and error control.ex-TFTP (Trivial File Transfer Protocol).
3. Multicasting
4. Used in conjunction with RTP (Realtime Transport Protocol) to provide a transport level mechanism for real time data.

64. What is switching in a network?
Soln: Switching in networks can be defined as the path taken by packets to travel from source to destination. It can be connection oriented or connectionless.

65. What is circuit switching?
Soln: Circuit switching is a connection-oriented service i.e. there is a dedicated path from sender to receiver.
e.g. Telephone line at the sender and receiving end.

66. What is Packet switching?
Soln: Packet switching is a connectionless service i.e. there is no

dedicated path between sender and receiver. In this type of service Bandwidth is fully utilized as unrelated sources can use any path. But there are high chances of data lost and error, i.e. packets may arrive in wrong order.

67. What is MMU?

Soln: MMU stands for Maximum Transfer Unit. It specifies the largest amount of data that can be transferred across a given physical network. If the receiving network MTU is less than the sender, then fragmentation is required.

68. What is TTL? Why it is required?

Soln: TTL stands for Time To Live.TTL will be used to avoid packet looping in a network. Every IP packet will be delivered with a TTL value. When a router decodes an IP packet, it decrements TTL value by 1.If the value after decrement becomes zero, the packet will be discarded and an error message will be sent back to the source.

69. What is Ethernet technology?

Soln: Ethernet technology is a high speed (10 mbps), packet switching, broadcast bus technology. It is bus because all the stations share single etherchannel. It is broadcast because all the stations receive every single transmitted signal.

70. What are the differences between static IP address and dynamic IP address?

Soln: **Static IP address-** is usually configured by the administrator/user manually. Once this is assigned that IP address can not reused by any other device in the same network.
Dynamic IP address- will be provided to each device by DHCP server at the time of their TCP/IP stack initialization.

71. What is Ethernet?

Soln: Ethernet is the dominant form of LAN. Ethernet is a LAN media type that operates at the data link layer.

72. What is Intranet?

Soln: An Intranet is a network that is local to a company.

73. What is extranet?

Soln: An extranet is an extended intranet where certain internal services are made available to known external users or external business partners at remote locations.

74. What is the difference between Internet and Intranet?

Soln: An Internet is an open public space while an Intranet is designated to be a private space. An Intranet may be accessed from the Internet but as a rule it is protected by a password and accessible only to employees or other authorized users.

75. What is Telnet?

Soln: Telnet is Terminal Emulation Protocol that allows you to make a terminal connection to other computers on the Internet. This requires that you run a telnet client on your computer and connect to a telnet server on the other machine.

To run a telnet client in windows type telnet<IP Address> in the command prompt.

76. What is wildcard mask?

Soln: A Wildcard mask is a mask of bits that indicates which parts of an IP address are available for examination. They are used in several places, for example:

i) To indicate the size of a network or subnet for some routing protocols, such as OSPF.

ii) To indicate what IP addresses should be permitted or denied in Access Control Lists(ACLs).

At a simplistic level a wildcard mask can be thought of as an inverted subnet mask. For example, a subnet mask of 255.255.255.0 (binary equivalent = 11111111.11111111.11111111.00000000) inverts to a wildcard mask of 0.0.0.255.

A wildcard mask is a matching rule.The rule for a wildcard mask is:

- 0 means that the equivalent bit must match
- 1 means that the equivalent bit does not matter

They are different from subnet Masks in that they can target a specific Host, specific IP address, specific Network, specific Subnet, or a range of IP addresses. They can even target all even or all odd networks. All of these capabilities make the Wildcard Mask much more flexible than the Subnet mask.

77. Why nslookup is used?

Soln: To find all the IP addresses for a given domain name,
the command nslookup is used.

78. Why traceroute command is used?

Soln: A handy utility to view the number of hops and
response time to get to a remote system or
web site is traceroute.

79. What are the different modes of data transmission?

Soln: There are three ways or modes of data transmission**:** Simplex, Half duplex (HDX), Full duplex (FDX)

Simplex: In Communication Networks, Communication can take place in

one direction connected to such a circuit are either a send only or receive only device.Communication is unidirectional.
TV broadcasting is an example. Another example of simplex transmission is loudspeaker system.
Half Duplex: A half duplex system can transmit data in both directions, but only in one direction at a time
A walkie-talkie operates in half duplex mode. It can only send or receive a transmission at any given time. It cannot do both at the same time.
Full Duplex: A full duplex system can transmit data simultaneously in both directions on transmission path. Full-duplex method is used to transmit the data over a serial communication link.
Telephone networks operate in full duplex mode when two persons talk on telephone line, both can listen and speak simultaneously.

80. What is CSMA?
Soln: Carrier Sense Multiple Access or CSMA is a Media Access Control (MAC) protocol that is used to control the flow of data
in a transmission media so that packets do not get lost and data integrity is maintained. There are two modifications to CSMA, the CSMA CD (Collision Detection) and CSMA CA (Collision Avoidance), each having its own strengths.

81. What is subnet addressing?
Soln:Subnet addressing allows an autonomous system made up of multiple networks to share the same Internet address.

82. What are the differences between CSMA/CD and CSMA/CA?
Soln: The differences between CSMA/CD and CSMA/CA
1. CSMA/CD takes effect after a collision while CSMA/CA takes effect before a collision.
2.CSMA/CA reduces the possibility of a collision while CSMA/CD only minimizes the recovery time.
3.CSMA/CD is typically used in wired networks while CSMA CA is used in

wireless networks.
4. CSMA/CD is standardized in IEEE 802.3 and CSMA/CA is standardized in IEEE 802.11.

83. What is transparent bridge?
Soln: A transparent bridge is a common type of bridge that observes incoming network traffic to identify media
access control (MAC) addresses. These bridges operate in a way that is transparent to all the network's connected hosts.
A transparent bridge records MAC addresses in a table that is much like a routing table and evaluates that
information whenever a packet is routed toward its location. A transparent bridge may also combine several
different bridges to better inspect incoming traffic. Transparent bridges are implemented primarily in Ethernet networks.

84. What are the differences between pure aloha and slotted aloha?
Soln: The differences between pure aloha and slotted aloha
1.Pure aloha does not require global time synchronization whereas slotted aloha does require global time synchronization.
2. Pure Aloha is a Continuous time system whereas Slotted Aloha is discrete time system.
3. In Pure aloha a frame can be sent at any time whereas in slotted aloha a frame can be sent at fixed times.

85. Your router has the following IP address on Ethernet0: 172.16.2.1/23. how many bits required for subnet address ?
Soln: Here network IP address 172.16.2.1 so network in class B. so the subnet mask is 255.255.0.0. and in this network number of subnet is 23. so the 5 bit is required for subnet address.

86.What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?

Soln: Here first three octant are net id and last octant here used as host and subnet id. local subnet mask is 255.255.255.224 so in last octant first 3 bit is used for subnet mask and rest 5 bit is used for host IP addresses. So maximum 32 number of IP can be assigned.

87.You need to subnet a network that has 5 subnets in class C, each with at least 16 hosts. Which classful subnet mask would you use?

Soln: In this network is in class C so first three octant is used for network id and last octant is used for subnet id and host id. Here for 5 subnet in last octant first 3 bit is required so the subnet mask is 255.255.255.224.

88. How do i find the subnet mask, net id and hostid of ip address 141.241.2.14.

Soln:The first octet (141) indicates it is a class B network (Class B networks have a range of 128 through 191). Therefore, the subnet mask will be 255.255.0.0 . With that, the network portion will be 141.241.0.0, and the host portion will be 2.14.

89. What is the difference between TDM and FDM?

Soln: The differences between TDM And FDM are

1. FDM divides the channel into multiple, but smaller frequency ranges to accommodate more users, while TDM divides a channel by allocating a time period for each channel.
2. TDM provides much better flexibility compared to FDM.
3. FDM proves much better latency compared to TDM.

90. What is multiplexing?

Soln:In telecommunications and computer networks, multiplexing (sometimes contracted to muxing) is a method by which multiple analog message signals or digital data streams are combined into one signal over a shared medium. The aim is to share an expensive resource.

91. What is bit rate and baud rate?

Soln:The bit rate is the number of bits transmitted per second, whereas, the baud rate is the number of signal units transmitted per

second and one signal unit is able to represent one or more bits. Therefore, baud rate is always less than or equal to the bit rate but never greater.

92. What is the bit rate and baud rate for an analogue signal that carries 3 bits in each signal unit if 2000 signal units are sent per second?
Soln: Baud rate = 2000 baud per second, Bit rate = 2000 x 3 = 6000 bps.

93. What is the baud rate for an analogue signal if the bit rate of the signal is 2000 bps and each signal unit carries 4 bits?
Soln: Baud rate = 2000 / 4 = 500 baud.

94. Name the two sublayers of data link layer.Specify their protocols.
Soln: The two sublayers of data link layer are
1) Logical Link Control(LLC)
Protocols-SDLC,NETBIOS,NETWARE.
2) Media Access Control
Protocols-CSMA/CA,Slotted-ALOHA,CDMA.

95. How does Ethernet work? How big is an Ethernet address?
Soln: Ethernet is normally a shared media LAN.All stations on the segment share the total bandwidth, which is either 10 Mbps (Ethernet), 100 Mbps(Fast Ethernet) or 100 Mbps(gigabit Ethernet). With switched Ethernet, each sender and receiver pair has the full bandwidth.
Ethernet uses the CSMA/CD technology to broadcast each frame onto the physical medium(fiber,wire etc).All stations attached to the Ethernet are “listening” and the stations with the matching destination address accepts the frame and checks for frame.It is a data link protocol(MAC layer protocol) and functions at layers 1 and 2 of the OSI model.A unique number is assigned to each Ethernet network adapter.It is 48 bit number maintained by the IEEE.

96. Why FDM is used for analog signals and TDM is used for digital signals?

Soln:FDM stands for frequency division multiplexing and it is used only in case of analog signals because analog signals are continuous in nature and the signal have frequency.
TDM-stands for time division multiplexing and it is used only in case of digital signals because digital signals are discrete in nature and are in the form of 0 and 1s. and are time dependent.

Database Management System

1. What is Database Management System?
Soln: Database Management System is a software which takes care of storing and retrieving information from the database.It is a software that assists in maintaining and utilizing a database.

2. What is Database?
Soln: Collection of data and set of programs to access and manipulate data.

3. What is redundancy?
Soln: Storage of same data in multiple tables.If a person's name and address were to be stored in more than one table then person's name and address would be considered as redundant data.

4. Describe the three levels of data abstraction?
Soln: The are three levels of abstraction:
Physical level: The lowest level of abstraction describes how data are stored.
Logical level: The next higher level of abstraction, describes what data are stored in database and what relationship among those data.
View level: The highest level of abstraction describes only part of entire database.

5. What is the difference between data and information?
Soln: Data is recorded facts and figures, and information is knowledge derived from data. A database stores data in such a way that information can be created.

6. Main difference between a simple file and database?
Soln: database has independent way of accessing information
while simple files do not.
Files do not provide multi-user capabilities while a DBMS can provide multi-user capabilities.

7. What is extension?
Soln:Extension -It is the number of tuples present in a table at any instance.
This is time dependent.

8. What is intension?
Soln: Intension -It is a constant value that gives the name, structure of table and the constraints laid on it.

9. What are the Large object types supported by Oracle?
Soln: The large object types supported by Oracle
1) CLOB and LONG for large fixed-width character data
2) NCLOB for large fixed-width national character set data
3) BLOB and LONG RAW for storing unstructured data
4) BFILE for storing unstructured data in operating system files.

10. What is sql*Loader?
Soln: SQL*Loader is a bulk loader utility used for moving data
from external files into the Oracle database.

11. What is Tablespace?
Soln:A database is divided into Logical Storage Unit called tablespaces.
A tablespace is used to group related logical structures together.

12. When does a Transaction end ?
Soln: When it is committed or Rollbacked.

13. Explain the difference between two and three-tier architectures?

Soln: Three-tier architecture includes a client and two server layers.
The application code is stored on the application server
and the database is stored on the database server.
A two-tier architecture includes a client and one server layer.
The database is stored on the database server.

14. What is Collation?

Soln: Collation refers to a set of rules that determine
how data is sorted and compared.

15. What is Data Independence?

Soln: Data independence means that "the application is independent of the storage structure and access strategy of data". In other words, The ability to modify the schema definition in one level should not affect the schema definition in the next higher level.
Two types of Data Independence:
Physical Data Independence: Modification in physical level
should not affect the logical level.
Logical Data Independence: Modification in logical level
should affect the view level.

16. How to find out the database name from SQL*PLUS command prompt?

Soln: select * from global_name;
select name from v$database;

17. Why transaction is necessary?

Soln: A transaction is a group of operations combined into a
logical unit of work. Developer uses transactions to control and
maintain the consistency and integrity of each action in a transaction,

despite errors that might occur in the system.

18. What is the difference between "NULL in C" and "NULL in Oracle?
Null in C: will return at least one value i.e void type value for the given program.
Null in oracle: any field or record can be null.It is not necessary to have value in it.It means it will not return any value.

19. What is the difference between Where and Having clause?
Soln: WHERE and HAVING both filters out records based on one or more conditions. The difference is, WHERE clause can only be applied on a static non-aggregated column whereas we will need to use HAVING for aggregated columns.

20. What is Functional Dependency?
Soln: Functional Dependency is the starting point of normalization. Functional Dependency exists when a relation between two attributes allows you to uniquely determine the corresponding attribute's value.

21. What is a Phantom Deadlock?
In distributed deadlock detection, the delay in propagating local information might cause the deadlock detection algorithms to identify deadlocks that do not really exist. Such situations are called phantom deadlocks and they lead to unnecessary aborts.

22. What do you mean by Serializability?
Soln: **Serializablity:** Serializability is generally the most accepted criterion for correctness for the execution of a given set of transactions.

A given execution of a set of transactions is considered to be correct if it is serializable.

23. What is metadata?

Soln: **Metadata:** The information about the data in a database is called the metadata.
For example if book is data metadata will be book name,author name,price,page number etc.

24. Define 2NF and 3NF.
Soln: **2NF-** A relvar is in 2NF if and only if it is in 1NF and every non key attribute is fully functionally dependent on the primary key.

3NF-A relvar is in 3NF if and only if it is in 2NF and every non key attribute is non transitively dependent on the primary key.

25. What is Data Dictionary?
Soln: Data Dictionary is a file that describes the basic organization of a database.A data dictionary contains a list of files in the database, the number of records in each file, and the names and types of each field.

26. What are the functions of Database Administrator?
Soln: The functions of Database Administrator:
1) Authorizing access to the database
2) Coordinating and monitoring its use
3) Acquiring software and hardware resources as needed.

27. What are the goals of DBMS?
Soln: The goals of DBMS
1) Retrieving information from the database.
2) Storing information into the database.

28. Define Cardinality.
Soln: Number of tuples in a relation is called the Cardinality of the relation.

29. What is instance and schema of DB?

Soln: **Instance Of DB:** The collection of information stored in DB at a particular moment is called instance of DB
Schema Of DB: The overall design of DB is known as DB schema.

30. Define Integrity.
Soln: The term integrity refers to the accuracy or correctness in the database.

31. Why Normalization is necessary?
Soln: Normalization is necessary to structure the data so that
i) It can be easily understood by users with no training in programming.
ii) We can add new data items,associations to the database without changing existing structure.
iii) Normalization of database is used to eliminate redundancy.
iv) Maintenance of data is easier.
v) It permits maximum flexibility in handling unanticipated uses of data.

32. What is the difference between commit and rollback?
Soln: A commit ends the current transaction and makes permanent any changes during the transaction.All transactional locks acquired on tables are released whereas a rollback does exactly opposite of commit.It ends the current tranaction and undoes any changes made during the transaction.All transactional locks acquired on tables are released.

33. What is view?
Soln: A view is a logical table that allows you to access data from other tables.A view contains no data itself.The tables upon which a view is based are called base tables.

34. Why view is used?
Soln: views are used to
i) provide additional level of table security by restricting access to a predefined set of rows/columns of a base table.

ii) To hide data complexity, for example a view based on the join of several tables acts as a single table.

35. What do you mean by transitive dependency?

Soln: If attribute A depends on B and B depends on C,due to which A depends on C,then A is said to be transitively dependent on C.transitive dependency causes problem in updation.

36. What do you mean by relational model?

Soln: Relational model represents the database as a collection of relations.The relation is displayed as a table with rows and columns.
In the formal relational model terminology, a row is called a tuple, a column header is an attribute and the table is known as relation.

37. What do you mean by trivial dependency?

Soln: An FD is trivial if and only if the right hand side is a subset of the left hand side.

38. What is the difference between char and varchar?

Soln: Char- This data type is used to store character string values of fixed length.The maximum number of characters this data type can hold is 255 characters.
Varchar- This data type is used to store variable length alphanumeric data. The maximum number of characters this data type can hold is 2000 characters.
The inserted values will not be padded with spaces.

39. What is super key?

Soln: A super key for an entity is a set of one or more attributes whose combined value uniquely identifies entities in the entity set. For example for an entity set employees,the set of attributes (emp-name,address) can be considered as a super key if we can assume that there are no two employees with the same name emp-name and

same address.

40. What do you mean by full functional dependency?
Soln: Attribute B is fully functionally dependent on attribute A if and only if it is functionally dependent on attribute A and not functionally dependent on any proper subset of A.
Take a relation
S=(Supplier_No,Supplier_Name,Supplier_Status,City)
City is functionally dependent on the(Supplier_No,Supplier_Status).It is not fully functionally dependent on this composite attribute because it is also functionally dependent on Supplier_No alone.

41. What is integrity constraints?
Soln: Integrity constraints ensure that changes made to the database by authorized users do not result in a loss of data consistency.

42. What is Domain Constraints?
Soln: Domain constraints specify the set of possible values that may be associated with an attribute.Such constraints may prohibit the use of null values for particular attributes.

43. What is transaction?
Soln: Collections of operations that form a single logical unit of work are called transactions.
Ti: read(A)
A: =A-50;
write(A);
read(B);
B:=B+50;

44. What do you mean by lost update problem of a transaction?
Soln: The updated value of one transaction is overwritten by another transaction.

RT1(A)
A: =A-100
RT2(A)
A: =A-100
WT1(A)
Commit T1
WT2(A)
Commit T2

45. What is relational schema?
Soln: Relational Schema is the list of attributes in a specific order.It does not conatin any tuples.

46. What is serialization graph?
Soln:Serialization graph is a directed graph with a set of nodes and directed arcs(arcs have a specific direction).It captures all potential conflicts between transactions in a schedule.

47. What is constraint?
Soln: A constraint is a rule that restricts the values that may be present in the database.

48.What is ACID property?
Soln: 1) Atomicity 2) Consistency 3) Isolation 4) Durability
1) Atomicity- It ensures that either all the effects of a transaction are reflected in database or none are.A failure can not leave the database in a state where a transaction is partially executed.
2) Consistency- It ensures that if the database is initially consistent the execution of the transaction leaves the database in a consistent state.
3) Isolation- It ensures that concurrently executing transactions are isolated from one another, so that each has the impression that no other transaction is executed concurrently with it.
4) Durability- It ensures that once a transaction has been committed

that transaction's updates do not get lost even if there is a system failure.

49. What is query language?

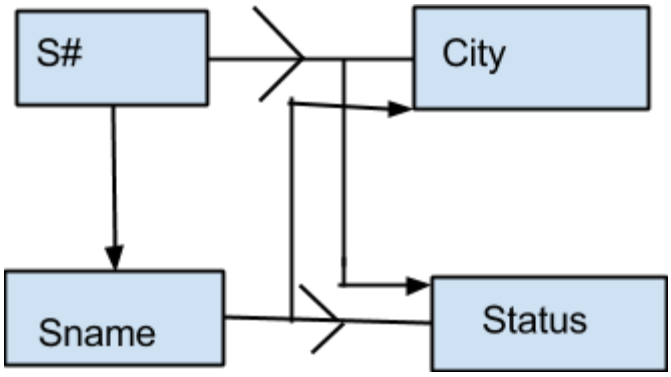
Soln: A query language is a language in which a user requests information from the database.

50. What is BCNF?

Soln: A relational schema is in BCNF if and only if every non- trival left irreducible functional dependency has a candidate key as its determinant.

A relation R is said to be in BCNF if whenever an FD X->A hold in R, then X is a super key of R.

Boyce-codd normal form(BCNF) is stricter than 3NF in the sense that every relation in BCNF is also in 3NF.However a relation in 3NF is not necessarily in BCNF.



Candidate keys are {S#}, {Sname}.

Conditions for BCNF

i) Two or more candidate keys

ii) The candidates keys are composite

iii) They overlap that means at least one attribute in common.

51. What is the difference between primary key and unique key?

Soln: Both primary key and unique key enforce uniqueness of the column on which they are defined.But by default a primary key creates a clustered index on the column whereas unique key creates a non clustered index by default.Also primary key does not allow NULL value,but unique allows NULL value,but only one.

52.What is the difference between trigger and stored procedure?

Soln: Trigger is a special type of stored procedure that is can not be called directly by a user.At the time of creating the trigger,it is defined to be executed, when a specific type of data modification (like insert,update or delete) is made against a specific table or column.

53. What is candidate key?

Soln: There is only one primary key in a table.But there can be multiple candidate keys.A candidate key is an attribute or set of attributes that uniquely identifies a record.These attributes or combination of attributes are called candidate key.In such a case one of the candidate keys is designated to be a primary key.The remaining keys are called alternate keys.

54. What is composite key?

Soln: In many cases, as we design a database, we will have tables that will use more than one column as part of the primary key.These are called composite keys or(concatenated keys).In other words, when a record can not be uniquely identified by a single field, in such cases a composite key is used.A composite key is a group of fields that uniquely identify a record.

55. What is DDL?

Soln: DDL(Data Definition Language) describes how data are structured in the database.

Ex. Create,Drop.

56. What is DML?

Soln: DML(Data Manipulation Language) specifies for the DBMS,what is required, the techniques used to process data.

Ex. Update,Delete.

57. What is database trigger?

Soln: Database triggers are database objects created via the SQL* PLUS tool on the client and stored on the server in the oracle engine's system table.

It is used for

1) Enforcing a business rule.
2) Enforcing security.
3) Cross table updates.

58. Why a transaction is called atomic?

Soln: A transaction is a unit of work in which a series of operations occur between BEGIN TRANSACTION and END TRANSACTION statements of an application.A transaction executes exactly once and is atomic - either all of the work is done or none of it.

59. What is stored procedure?

Soln: A stored procedure is a set of precompiled T-SQL statements which can be executed whenever required.These are similar to procedures in any other programming language and hence can accept input parameters and return output parameters and even can return status values to the calling procedure or batch to indicate success or failure along with the reason for the failure

Advantages of Using stored procedures are

1) Increased modularized programming
2) Faster execution as they are pre compiled.
3) Reduce the network traffic by sending the call to the stored

procedure,instead of sending hundreds of T-SQL lines which is embedded in the stored procedure.

60. Define database anomalies.

Soln: Database Anomalies are the problems in relations that occur due to redundancy in the relations.These anomalies affect the process of inserting,deleting and modifying data in the relations.Some important data may be lost if a relation is updated that contains database It is important to remove these anomalies in order to perform different processing on the relations without any problem.

61. What are the different types of database anomalies?

Soln: There are three different types of database anomalies as follows:

1.Insertion Anomaly- The insertion anomaly occurs when a new record is inserted in the relation.In this anomaly, the user can not insert a fact about an entity until he has an additional fact about another entity.

2. Deletion Anomaly- The deletion anomaly occurs when a record is deleted from the relation.In this anomaly, the deletion of facts about an entity automatically deleted the fact of another entity,

3. Modification anomaly- The modification anomaly occurs when a record is updated in the relation.In this anomaly,the modification in the value of specific attribute requires modification in all records in which that value occurs.

62. What is Inconsistent Data Problem?

Soln: Inconsistent Data Problem : Inconsistent data problem occurs when a transaction accesses data from the database and simultaneously another transaction is changing that data.

63. What is Uncommitted Data Problem?

Soln: Uncommitted Data Problem : Uncommitted data problem occurs when a transaction accesses data that has been updated by a previous transaction that has not yet ended.

64. What is concurrency control?

Soln: Concurrency Control : All RDBMS must ensure that the transactions of concurrent users do not interfere with each other. If it does not handle the transactions properly, the problems of lost update, uncommitted data, or inconsistent data might occur.

65. What is two phase commit?

Soln: In transaction processing, databases, and computer networking, the two-phase commit protocol (2PC) is a type of atomic commitment protocol (ACP). It is a distributed algorithm that coordinates all the processes that participate in a distributed atomic transaction on whether to commit or abort (rollback) the transaction.

66. What are the two methods that guarantee Serializability?

Soln: The two methods that guarantee serializability

1) Two Phase Locking
2) Timestamping

67. What is Trivial Functional Dependency?

Soln: A trivial functional dependency is a functional dependency of an attribute on a superset of itself.

A functional dependency R:X->Y is called trivial if Y is a subset of X.

For example,{Employee ID, Employee Address} ->{Employee Address}
is trivial,here {Employee Address} is a subset of {Employee ID,Employee Address}.

68. What is multivalued dependency?

Soln: A multivalued dependency is a constraint according to which the presence of certain rows in a table implies the presence of certain other rows.

For example,imagine a Gell pen maker company that manufactures

many models of Gell pen.If you have a table that contains the model name,color and year of each Gell pen the company manufactures,there is a multivalued dependency in that table.If there is a row for a certain model name and year in blue,there must also be a similar row corresponding to the red version of the same Gell pen.

69. What is index tuning?

Soln: Query performance as well as speed improvement of a database can be done using Indexes.The process of enhancing the selection of indexes is called Index Tuning.

70. What are the advantages of DBMS over traditional file based systems?

Soln:Database management systems were developed to handle the following difficulties of typical file-processing systems supported by conventional operating systems.

1. Data redundancy and inconsistency
2. Difficulty in accessing data
3. Data isolation – multiple files and formats
4. Integrity problems
5. Atomicity of updates
6. Concurrent access by multiple users
7. Security problems

71. Define 1NF with example.

Soln: A database is in first normal form if it satisfies the following conditions:

- Contains only atomic values
- There are no repeating groups

An atomic value is a value that cannot be divided. For example, in the table shown below, the values in the [Color] column in the first row can be divided into "red" and "green", hence [TABLE_PRODUCT] is not in 1NF. A repeating group means that a table contains two or more columns

that are closely related. For example, a table that records data on a book and its author(s) with the following columns: [Book ID], [Author 1], [Author 2], [Author 3] is not in 1NF because [Author 1], [Author 2], and [Author 3] are all repeating the same attribute.

1st Normal Form Example

How do we bring an unnormalized table into first normal form? Consider the following example:

TABLE_PRODUCT

Product ID	Color	Price
1	red, green	15.99
2	yellow	23.99
3	green	17.50
4	yellow, blue	9.99
5	red	29.99

This table is not in first normal form because the [Color] column can contain multiple values. For example, the first row includes values "red" and "green."

To bring this table to first normal form, we split the table into two tables and now we have the resulting tables:

TABLE_PRODUCT_PRICE

Product ID	Price
1	15.99
2	23.99
3	17.50
4	9.99
5	29.99

TABLE_PRODUCT_COLOR

Product ID	Color
1	red
1	green
2	yellow
3	green
4	yellow
4	blue
5	red

Now first normal form is satisfied, as the columns on each table all hold just one value.

72. Define 2NF with example.

Soln: A database is in second normal form if it satisfies the following conditions:

- It is in first normal form
- All non-key attributes are fully functional dependent on the primary key

In a table, if attribute B is functionally dependent on A, but is not functionally dependent on a proper subset of A, then B is considered fully functional dependent on A. Hence, in a 2NF table, all non-key attributes cannot be dependent on a subset of the primary key. Note that if the primary key is not a composite key, all non-key attributes are always fully functional dependent on the primary key. A table that is in 1st normal form and contains only a single key as the primary key is automatically in 2nd normal form.

2nd Normal Form Example

Consider the following example:

TABLE_PURCHASE_DETAIL

Customer ID	Store ID	Purchase Location
1	1	Los Angeles
1	3	San Francisco
2	1	Los Angeles
3	2	New York
4	3	San Francisco

This table has a composite primary key [Customer ID, Store ID]. The non-key attribute is [Purchase Location]. In this case, [Purchase Location] only depends on [Store ID], which is only part of the primary key. Therefore, this table does not satisfy second normal form.

To bring this table to second normal form, we break the table into two tables, and now we have the following:

TABLE_PURCHASE

Customer ID	Store ID
1	1
1	3
2	1
3	2
4	3

TABLE_STORE

Store ID	Purchase Location
1	Los Angeles
2	New York
3	San Francisco

What we have done is to remove the partial functional dependency that we initially had. Now, in the table [TABLE_STORE], the column [Purchase Location] is fully dependent on the primary key of that table, which is [Store ID].

73. Define 3NF with example.

Soln: A database is in third normal form if it satisfies the following conditions:

- It is in second normal form
- There is no transitive functional dependency

By transitive functional dependency, we mean we have the following relationships in the table: A is functionally dependent on B, and B is functionally dependent on C. In this case, C is transitively dependent on A via B.

3rd Normal Form Example

Consider the following example:

TABLE_BOOK_DETAIL

Book ID	Genre ID	Genre Type	Price
1	1	Gardening	25.99
2	2	Sports	14.99
3	1	Gardening	10.00
4	3	Travel	12.99
5	2	Sports	17.99

In the table able, [Book ID] determines [Genre ID], and [Genre ID]

determines [Genre Type]. Therefore, [Book ID] determines [Genre Type] via [Genre ID] and we have transitive functional dependency, and this structure does not satisfy third normal form.
To bring this table to third normal form, we split the table into two as follows:

TABLE_BOOK

Book ID	Genre ID	Price
1	1	25.99
2	2	14.99
3	1	10.00
4	3	12.99
5	2	17.99

TABLE_GENRE

Genre ID	Genre Type
1	Gardening
2	Sports
3	Travel

Now all non-key attributes are fully functional dependent only on the primary key. In [TABLE_BOOK], both [Genre ID] and [Price] are only dependent on [Book ID]. In [TABLE_GENRE], [Genre Type] is only dependent on [Genre ID].

74. What are clustered and nonclustered indexes?
Soln: Clustered indexes is the index according to which data is physically stored on disk. Therefore, only one clustered index can be created on a given database table.
Non-clustered indexes don't define physical ordering of data, but logical ordering. Typically, a tree is created whose leaf point to disk records.
B-Tree or B+ tree are used for this purpose.

75. Name Some schema objects.
Soln: Some schema objects are
1) Clusters-These are storage areas storing related tables and indexes.
2) Database triggers- These are stored subprograms associated with tables which are executed automatically.
3) Indexes- An index contains an entry for each value that appears in the indexed column(s) of table or cluster.Index provides fast access to rows.

4) Packages- A package is a collection of related procedures,functions and other program objects stored in the database.
5) stored procedures- A group of PL/SQL statements that can be invoked or called from SQL or PL/SQL.
6) Table- A table is a collection of related data.
7) Views- A virtual table that draws data from existing table, but actually does not contain data,only maintains pointers.

76. Compare a hierarchical and network database model?
Soln: The hierarchical model is a top-down structure where each parent may have many children but each child can have only one parent. This model supports one-to-one and one-to-many relationships. The network model can be much more flexible than the hierarchical model since each parent can have multiple children but each child can also have multiple parents. This model supports one-to-one, one-to-many, and many-to-many relationship.

77. Explain the difference between a dynamic and materialized view.
Soln: A dynamic view may be created every time that a specific view is requested by a user. A materialized view is
created and or updated infrequently and it must be synchronized with its associated base table(s).

78. What is a distributed database?
Soln:A distributed database is a single logical database that is spread across more than one node or locations that are all connected via some communication link. It requires multiple DBMSs, running at each remote site. A distributed database can be either homogenous (same DBMS at

each node) or heterogeneous (different DBMS at some nodes).

79. Why we use g with oracle 10g?

Soln:In 10g 'g' stands for Grid. It is so because Oracle 10g significantly supports use of grid concepts in it.

80. How many tables can a single database hold?

Soln: Using this query we can get how many tables a single database can hold.
SELECT COUNT(*) FROM information_schema.tables WHERE table_types='base table'.

81. What does an aggregate function do?Tell us some aggregate functions.

Soln: Aggregate function allows to perform a calculation on a group of rows.
Aggregate functions are sum,min,max,count,avg.

Software Engineering

1. What is Software?
Soln: Software- Software is a set of programs,rules,associated documentation and data.

2. What is Software Engineering?
Soln: Software Engineering- It is a systematic approach to the development,operation,maintenance and retirement of software.
It is an application of science and mathematics by which computer equipments are made available to man via computer programs, rules,associated documentation and data.Software Engineering is largely concerned with programming system products.

3. What is the goal of Software Engineering?
Soln: The goal of Software Engineering is to produce high quality software at low cost.

4. .What is software testing?
Soln: Testing- It is a process of executing a program with the intent of finding of an error.

5. What is acceptance testing?
soln: Testing conducted to enable to enable user/customer to determined whether to accepted a software product. normally performed to validate the software meets a set agreed accepted criteria.

6. What is Ad-hoc Testing?

A testing phase where the tester tries to break the system by trying the system's functionality.

7. What is white box testing?

Soln: White box testing- White box testing is a test case design method that uses the control structure of the procedural design to derive test cases.It is otherwise called as structural testing.

Knowledge of the internal logic of the system is used to develop test cases.It uses verification techniques.It is performed early in the testing process.

8. What is black box testing?

Soln: Black box testing- Black box testing is a test case design method that focuses the functional requirements of the software.It is otherwise known as functional testing.

No knowledge of the internal logic of the system is used to develop test cases.It uses validation techniques.It is perfomed during later stages of testing.Examples include unit testing,integration testing,system testing,acceptance testing.

9. Define verification and validation.

Soln: Verification- Verification refers to the set of activities that ensure the software correctly implements a specific function.

Am I building the product right?

Validation- Validation refers to the set of activities that ensure the software that has been built is traceable to customer requirements.

Am I building right product?

10. Define cohesion and coupling?

Soln:Cohesion- It is a measure of the relative functional strength of a module.

Coupling- It is a measure of the relative interdependence among modules.
High cohesion and low coupling is the goal of software engineering.

11. What are the advantages and disadvantages of white box testing?
Soln: Advantages-

Software's structure logic can be tested.

Disadvantages-

i) Does not ensure that the user requirements are met.
ii) Its test do not mimic real world situations.

12. What are the advantages and disadvantages of black box testing?
Soln: Advantages-

i) Simulates actual system usage.
ii) Makes no system structure assumptions.

Disadvantages-

i) Potential of logical errors in software.
ii) Possibility of redundant testing.

13. Define alpha and beta test.
Soln: Alpha test- It is the test that is conducted at the developer's site by a customer.
Beta test- It is the test that is conducted at one or more customers sites by the end users of the software.

14. What is loop testing?
Soln: Loop testing- It is a white box testing techniques that focuses exclusively on the validity of the loop constructs.This technique can be applied to simple loops,nested loops,concatenated loops and unstructured loops.

15. What is regression testing?
Soln: Regression testing is a testing technique that is performed to make sure that previously working functionality still works, after

changes elsewhere in the system.

16. What is SDLC?

Soln: SDLC (Software Development Life Cycle) is the process of developing software through business needs,analysis,design, implementation and maintenance.

Software Development Life Cycle or Software Development Process defines the steps/stages/phase in the building of software.

17. What is Software Configuration Management?

Soln: Software Configuration Management (SCM) is the task for tracking and controlling changes in the software.It helps in maintaining different versions of configurable items.

18. What is cyclomatic complexity?

Soln: Cyclomatic complexity is a software metric that is used to measure the complexity of a program.It directly measures the number of linearly independent paths through a program's source code.It is computed using a graph that describes the control flow of a program.

Cyclomatic complexity M is calculated as

M=E-N+2P where

E=Number of edges of the graph

N=Number of nodes of the graph

P= Number of connected components (exit nodes)

19. What are the benefits of prototyping?

Soln: Some of the benefits of prototyping include-

1) Gain important feedback from users early in the development time.

2) Provide a common baseline for users and developers to identify problems and opportunities.

3) motivate user involvement.

4) Help to prevent misunderstanding between users and developers.

5) Strengthen working relationships between the users and developers.

20. What are the shortcomings of prototyping?

Soln: Prototyping has the shortcomings

1) Leading users to overestimate the capabilities of a software product.
2) Difficulties in project management and control.
3) Difficulty in applying the technique to large systems design.
4) Difficulties in maintaining necessary user interest.

21. Define Formal Technical Review.

Soln: It is a software quality assurance activity performed by software engineers and others.The objectives of FTR are-

1) To uncover errors in function,logic or implementation for any representation of the software.
2) To verify that the software under review needs its requirements.
3) To make projects more manageable.

22. What do you mean by quality of design and quality of conformance?

Soln: Quality of design refers to the characteristics that designers specify for an item. Quality of conformance is the degree to which the design specifications are followed during manufacturing.

23. What is software reliability?

Soln: A simple measure of reliability is mean time between failure(MTBF) where MTBF=MTTF(mean time to failure)+MTTR(mean time to repair) .

24. What is software availability ?

Soln: software availability is the probability that a program is operating according to requirements at a given point in time and is defined as availability= MTTF/(MTTF+MTTR)*100%

25. Why spiral model is known as meta model?

Soln: Spiral model can be viewed as a meta model because it

subsumes all the other models.For example a single loop spiral actually represents the waterfall model.The spiral model uses a prototyping approach by first building a prototype before actual product development starts.Also the spiral model can be considered as supporting the evolutionary model, the iterations along the spiral can be considered as evolutionary levels through which the complete system is built.

26. What is function point(FP) metric?

Soln: Function Point metric is used to easily estimate the size of the software product directly from the problem specification.The conceptual idea behind the function point metric is that the size of a software product is directly dependent on the number of different functions or features it supports.

FP=UFP(Adjusted Function Point)*TCF(Technical Complexity factor)

27. What is UFP(Unadjusted Function Point)?

Soln: Function Point is computed in three steps.The first step is to compute the UFP.

UFP=(Number of inputs)*4+(Number of outputs)*5+(Number of inquires)*4+(Number of files)*10+(Number of interfaces)*10

28. What is COCOMO Model?

Soln: COCOMO(COnstructive COst estimation MOdel) is a heuristic estimation technique by which we estimate the project parameters like effort,time of development etc.

29. What is CPM?

Soln:A path from the start node to finish node containing only critical tasks is called a critical path.Thus any path whose duration equals Minimum Time(MT) is a critical path.

30. What is software requirement specification(SRS) document?

soln: The SRS document the final outcome of requirement analysis and

specification phase.

31. What is Gantt chart?
soln: Gantt Chart is mainly used to allocate resources to activities. The resources allocated to activities include staff , software and hardware. gantt charts are useful for resource planning. A gantt is a special type of bar chart where each bar represents an activity. The bars are drawn along a timeline. the length of each bar is proportional to the duration of time planned for the corresponding activity.

32. What is slack time in gantt chart?
soln: A gantt is a special type of bar chart where each bar represents an activity. Each bar consists of a white part and a shaded part. the shaded part of the bar shows the length of the time each task is estimated to take. The white part shows the slack time, that is the latest time by which a task must be finished.

33. What is PERT chart?
soln: PERT(Project Evaluation and Review Technique) charts consists of a network of boxes and arrows. The boxes represents activities and the arrows represent task dependencies. PART charts represents the statistical variation in the project estimates assuming a normal distribution.

34. What is WBS?
soln: WBS(Work Breakdown Structure) is used to decompose a given task set recursively into small activities.

35. What is the KLOC?
soln: KLOC (kilo Lines of code) is used for measure of project size.

36. Why we study software engineering?
soln: We study software engineering because

1) The skill to participate in development of large software products.
2) We would learn how to effectively handle complexity in a software development problem.

37. why software engineering is called engineering?
soln: Engineering means specific application of science and mathematics. It gives the logical idea about any software and not physical implementation so it is called software engineering.

38. What are the disadvantage of a spiral model?
soln: the disadvantage of a spiral model
1) It is risk driven.
2) It is more complicated than other model.
3) It requires knowledgeable staff.
4) it is not very suitable for development of a product as outsourced projects since the product risks need to be continually assessed as it is developed.

39. Who is good software engineer?
Soln: 1) Familiarity with software engineering principles.
2) Good technical knowledge of project areas.
3) Good programing abilities.
4) Good communication skills like oral, written and interpersonal skill.
5) High motivation.
6) Sound knowledge of fundamentals of computer science.
7) Intelligence.
8) Ability to work in a team.
9) Discipline.

40. What is stub module?
Soln: Module required to provide the necessary environment for unit testing. A stub procedure is a dummy procedure that has the same I/O parameters as the given procedure, but has a highly simplified

behaviour.

41. What is driver module?

Soln: Module required to provide the necessary environment for unit testing.A driver module should contain the non-local data structures accessed by module under test.

42.What is control flow graph (CFG)?
Soln: CFG describe the sequence in which the different instruction of a program get executed.

43. What is McCabe's Cyclomatic Complexity Metric?
Soln: McCabe's Cyclomatic Complexity defines an upper bound on the number of independent paths in a programs.

44.What are the methods to compute the Cyclomatic Complexity?
Soln: There are three methods to compute the Cyclomatic Complexity.
Methods 1: Given a control flow graph G of a program, the cyclomatic V(G) can be computed as:
V(G)=E-N+2
where E=no of edge and N=no of edge.
Method 2: In this method to computing cyclomatic complexity of a program from an inspection of its control flow graph is as follows:
V(G)= Total number of non-overlapping bounded area + 1
Method 3: The cyclomatic complexity of a program can also be easily computed by computing the number of decision and loop statements of the program. If N is the number of decision and loop statement of a program, then
V(G)=N+1

45.What is mutation testing?
Soln: Mutation testing is to make a few arbitrary changes to a program

at a time. Each time the program is changed, it is called a **mutated** program and the changes change effected is called **mutant**. Depending on the change made to the code, a mutated program may or may not introduce some errors. A mutation operator makes specific changes to a program.

46. What is debugging?

Soln: After a failure has been detected, it is necessary to first identify the program statement that are in error and are responsible for the failure, the error can then fixed.

47.What is Brute force method?

Soln: In this approach, print the intermediate values with the hope that some of the printed values will help to identify the statement in error.

48.What is Backtracking?

Soln: In this approach, beginning from the statement at which an error symptom has been observed. Unfortunately, as the number of source lines to be traced back increases, the number of source lines to be traced back increases, the number of potential backward paths increases and may becomes unmanageable large for complex programs, limiting the user of this approach.

49. Performance testing?

Soln: Performance testing is carried out to check whether the system meets the non-functional requirement identified in SRS document.

50.What is regression testing?

Soln: This type of testing is required when the system being tested is an upgradation of an already existing system to fix some bugs or enhance functionality, performance etc.

51. Which type of model is suitable in which project ?

Soln: Iterative model is suitable for any small project which has

minimum risk. Prototype model is suitable that project which has no previous experience, project are implemented first time. evaluation method are suitable in object-oriented software development projects. Spiral model is suitable for that project which are required secured and minimum risk.

52. What is test case?

Soln: A test case is a set of conditions or variables under which a tester will determine whether a system under test satisfies requirements or works correctly.The process of developing test cases can also help finding problems in the requirements or design of an application.

53.Mention the categories of debugging approaches?

Soln: There are three categories of debugging approaches as follows :

1) Brute force
2) Backtracking
3) Cause elimination

54. Give some practical real life examples of Spiral Model

Soln. The most popular real life examples for sdlc Spiral model are Microsoft Windows operating System, Visual Studio Manager, Adobe Photoshop, WordPress CMS and many more.

55. Why agile is so popular?

Soln: Agile methodology is too advanced and complex than the simple Waterfall model. The feasibility of agile to reshape the entire development structure to suit the most effective outcome.

Object Oriented Technology

1. Define class and object.

Soln: Class: It is a collection of objects of similar type.

Object- It is an instance of a class.Object is a member of a class.

For ex-Fruit is a class then objects will be mango, litchi, apple, guava etc.

If data type is a class then members of that data type will be objects.

int a,b,c;

Here int is a class and a,b and c are objects.

2. What are the core OOP's concepts?

Soln: Abstraction,Encapsulation,Polymorphism and inheritance are the core OOP's concepts.

3. Define Inheritance.

Soln: The mechanism of driving a new class from old one is known as inheritance.The old class is called base class,parent class or super class.

The new class is called subclass, child class or derived class.

The properties of superclass will be inherited by its subclasses or child classes.Subclass will contain

i) Properties of super class

ii) Its own individual properties.

4. Define polymorphism.

Soln: Polymorphism means one name having multiple forms.The set of actions performing different operations share the same name.

Example- Method overloading and method overriding are examples of polymorphism.

5. What is constructor?

Soln: A constructor is a method that enables an object to initialize itself when it is created.

Constructors have the same name as the class itself.They do not specify a return type not even void.They return the instance of the class itself.

Example:

```
class room
{
int length;
int width;
room(int x,int  y)
{
length=x;
width=y;
}
int area()
{
return(length*width);
}
}
```

6. Define method overloading.

Soln: Methods that have the same name but with different parameter lists and different definitions are called method overloading.method overloading is used when objects are required to perform similar tasks but with different input parameters.

```
class rectangle
{
int length;
int width;
rectangle(int x,int y)
{
```

```
length=x;
width=y;
}
rectangle(int x)
{
length=width=x;
}
int area()
{
return(length*width);
}
}
```

7. Define encapsulation.

Soln: The wrapping up of data and functions into a single unit is known as encapsulation.

The data and its corresponding functions are kept inside an object.This object acts as a blanket or wrapper to the data.The data remains hidden and protected.

8. Define persistence.

Soln: It is the property of an object which extends its existence into space and time.

9. What is method overriding?

Soln: Method overriding, in Object Oriented Programming, is a language feature that allows a subclass or child class to provide a specific implementation of a method that is already provided by one of its superclasses or parent classes. The implementation in the subclass overrides (replaces) the implementation in the superclass by providing a method that has same name, same parameter or signature, and same return type as the method in the parent class.

10. What are the difference between Procedural Oriented Programming and Object Oriented Programming?

Soln:

Procedural Oriented Programming	Object Oriented Programming
1. Data is not secured.	1. Data is secured.
2. Data is open.	2. Data is hidden.
3. Concept of classes.	3. No such concept.
4. Program is divided into functions.	4. program is divided into Objects.
5. Supports inheritance,polymorphism and abstraction.	5. Does not support inheritance,polymorphism and abstraction.
6. Example-C, FORTRAN	6. Example- C++,JAVA

11. How are this() and super() used with constructors?

Soln: this() is used to invoke a constructor of the same class. super() is used to invoke a superclass constructor.

12. Is Empty .java file a valid source file?

Soln: Yes. An empty .java file is a perfectly valid source file.

13. Give real life example of inheritance and polymorphism?

Soln: **Inheritance**- A scientific calculator is an extended form of calculator.Here calculator is a parent and scientific calculator is a child object.

Polymorphism-A person who knows more than two languages he can speak in a language which he knows.Here person is object and speaking is polymorphism.

Another example of Polymorphism if a girl is married and mother of 2 children doing teaching job in a school then she is a woman first,teacher in a school,wife of someone at home,mother of her children,daughter of

someone and may be girl friend of someone means a woman plays different roles at different times that is polymorphism(many forms).

14. What is transient variable?
Soln: Transient variable is a variable that can not be serialized.

15. Which class in java is extended by all other classes?
Soln: The object class is extended by all other classes.

16. What are the differences between C++ and Java?
Soln:The differences between Java and C++ are
i) Java is a true object oriented language while C++ is basically C with object oriented extension.
ii) C++ supports multiple inheritance whereas Java supports interface in case of multiple inheritance.
iii) Java does not use pointers.
iv) Java does not have template classes as in C++.
v) Java does not support operator overloading.

17. What is the difference between this() and super() method?
Soln: this() method is used to invoke the constructor method of the same class.super() method is used to invoke the constructor method of the superclass.

18. What is singleton class?
Soln: In Object Oriented Programming, a singleton class is a class that can have only one object at a time.

19. What is Java Runtime Environment(JRE)?
Soln: Java Runtime Environment(JRE) is an implementation of Java Virtual Machine(JVM) which executes java programs.

20. What is the base class of all classes in Java?
Soln: java.lang.Object

21. What do you mean by stream?
Soln: Java handles all input and output in the form of streams.
A stream is a sequence of bytes travelling from a source to a destination over a communication path.
Two basic streams used are the input and the output streams.

22. What is exception?
Soln:Exception is a runtime error in a program.Exception is an abnormal condition that arises during the program execution and disrupts the normal flow of instruction.The abnormal conditions that may occur during program execution are
i. Running out of memory.
ii. Resource allocation of errors.
iii. Inability to find a file.
iv. problems in network connectivity.

23. What is package?
Soln: Package is a container of classes.Ex-java.lang,java.util,java.awt etc.

24. What is interface?
Soln: An interface is basically a kind of class.Like classes, interfaces contain only methods and variables but with a major difference.The difference is that interfaces define only abstract methods and final fields.This means that interfaces do not specify any code to implement these methods and final fields contain only constants.

Example:
```
interface Area
{
```

```
final static float pi=3.14F;
float compute(float x,float y);
}
class rectangle implements Area
{
public float compute(float x,float y)
{
return(x*y);
}
class circle implements Area
{
public float compute(float x,float y)
{
return(pi*x*x);
}
}
```

25. What is wrapper class?

Soln: Vectors can not handle primitive data types like int,float,long,char and double data types.Primitive data types may be converted into object types by using the wrapper classes contained in java.lang package.

```
int i=Integer.parseInt(str);// to obtain a integer number from a string.
```

26. What is applet?

Soln: Applets are small java programs that are primarily used in internet computing.An applet like any application program can do many things for us.It can perform arithmetic operations,display graphics,accept user input,play sounds,create animation and play interactive games.

Example:

```
import java.awt.*;
import java.applet.*;
```

```
public class hello extends applet
{
public void paint(Graphics g)
{
g.drawString("Hello",10,100);
}
}
```

27. What are the differences between applets and stand-alone applications?

Soln: The differences between applets and stand-alone applications are

1) Unlike stand-alone applications applets do not use the main() method for initiating the execution of the code.Applets, when loaded, automatically call certain methods of applet class to start and execute the applet code.

2) Unlike stand-alone applications, applets can not be run independently.They are run from inside a web page using a special feature known as HTML tag.

3) Applets can not read from or write to the files in the local computer.

4) Applets can not communicate with other servers on the network.

5) Applets can not run any program from the local computer.

6) Applets are restricted from using libraries from other languages such as C or C++.

28. What is the use of abstract class?

Soln: 1) Abstract classes can be used to create object references.

2) It can be used to point to a subclass object.

29. Why we use final keyword?

Soln: 1) It can be used to create the equivalent of a named constant.

2) To disallow a method from being overridden.We specify final as a modifier at the start of its declaration.

3) We use final to prevent inheritance.

30. What is multithreading in java?

Soln: Multithreading is a powerful programming tool that makes java distinctly different from its fellow programming language.It enables programmer to do multiple things at one time.They can divide a long program into threads and execute them in parallel.

Threads in java are subprograms of a main application program and share the same memory space.They are known as lightweight processes or light weight threads.Threads are extensively used in java enabled browsers such as HotJava.

31. What is UML?

Soln: UML(Unified Modelling Language) is the language used for specifying,visualizing,constructing and documenting the artifacts of software systems as well as business modelling and others non software system.

32. What are the goals of UML?

Soln: The goals of UML are

1) Provide users with a ready to use expressive visual modelling language so that they can develop and exchange meaningful model.
2) Provide extensibility to extend code concept.
3) Be independent of particular programming language and developing process.
4) Encourage growth of object oriented tools market.
5) Support higher level development concept.
6) Integrate best practices.

33. What is the difference between sequence diagram and collaboration diagram?

Soln: The difference between sequence diagram and collaboration diagram is

1) In sequence diagram primary focus is time.It shows how a sequence of messages are sent and received between a set of objects in order to perform some function whereas in collaboration diagram the primary focus is on space.Here relationship between objects are shown.

34. Why extends keyword is used?

Soln: The keyword extends signifies that the properties of superclass name are extended to the subclass name.

35. What are the features of Java?

Soln: **Features of Java**

1) Compiled and interpreted
2) Platform independent and portable
3) Object oriented
4) Robust and secure
5) Distributed
6) Simple,small and familiar
7) Multithreaded and interactive
8) High performance.

36. What is dynamic method dispatch?

Soln: Dynamic method dispatch is a mechanism by which a call to an overridden method is resolved at run time rather than at compile time.Dynamic method dispatch is important this is how java implement run time polymorphism.

37. What is inner class?

Soln: Class present within a class is called inner class.Inner classes increase the complexity of code and should be used only if absolutely necessary.Inner classes are used to implement adapters in awt program.

38. What is the use of transient keyword?

Soln: On object serialization if any of the object's members need not be serialized, they should be declared as transient.

39. What is the use of final keyword?

Soln: Java uses final keyword to avoid a class or method to be overridden.Using final with variable is somewhat similar to using const in C++.

40. What is the difference between constructor and method?

Soln:A constructor is a member function of a class that is used to create objects of that class. It has the same
name as the class itself, has no return type, and is invoked using the new operator.
A method is an ordinary member function of a class. It has its own name, a return type (which may be void), and is invoked using the dot operator.

41. What if I write static public void instead of public static void?

Soln: Program compiles and runs properly.

42. What are the advantages of inheritance?

Soln: The advantages of inheritance
1) It permits code reusability.
2) Reusability saves time in program development.
3) It encourages the reuse of proven and debugged high-quality software, thus reducing problem after a system becomes functional.

43. What is the use of finalize keyword?

Soln:Use of finalize :

1) finalize method belongs to Object class, is used by java garbage collector.
2) It's called by the garbage collector on an object when garbage collection determines that there are no more references to the object.

signature : protected void finalize() throws Throwable

44. What are the differences between interface and abstract class?

Soln:The differences between interface and abstract class

1) A subclass can extend only one abstract class but it can implement multiple interfaces.

2) Abstract classes can extend another class and implement interfaces but interface can only extend other interfaces.

3) Abstract classes can have constructors but interfaces can't have constructors.

4) Abstract classes can have methods with implementation whereas interface provides absolute abstraction and can't have any method implementations.

5) Abstract keyword is used to create an abstract class and it can be used with methods also whereas interface keyword is used to create interface and it can't be used with methods.

6) Abstract classes methods can have access modifiers as public, private, protected, static but interface methods are implicitly public and abstract, we can't use any other access modifiers with interface methods.

7) Abstract class have all the features of a normal java class except that we can't instantiate it. We can use abstract keyword to make a class abstract but interfaces are a completely different type and can have only public static final constants and method declarations.

8) Subclasses use extends keyword to extend an abstract class and they need to provide implementation of all the declared methods in the abstract class unless the subclass is also an abstract class whereas subclasses use implements keyword to implement interfaces and should provide implementation for all the methods declared in the interface.

45. What are the difference between path and classpath?

Soln:The PATH environment variable is typically something that the

operating system uses to find executable files whereas The CLASSPATH environment variable is typically something that implementations of the Java Virtual Machine (JVM) use to find Java class files.

46. What is namespace?

Soln: Namespaces allow us to group a set of global classes, objects and/or functions under a name.

47. What is a scope resolution operator?

Soln: A scope resolution operator (::), can be used to define the member functions of a class outside the class.

48. What is the difference between Object and Instance?

Soln:An instance of a user-defined type is called an object. We can instantiate many objects from one class.An object is an instance of a class.

49. What is this pointer?

Soln: It is a pointer that points to the current object. This can be used to access the members of the current object with the help of the arrow operator.

50. What is the difference between class and structure?

Soln: The differences between class and structure

1. By default, the members ot structures are public while that class is private.
2. structures doesn't provide something like data hiding which is provided by the classes.
3.structures contains only data while class bind both data and member functions.

51. What are all the operators that cannot be overloaded?

Soln: The operators that can not be overloaded are

1.Direct member access operator
2. Dereference pointer to class member operator.*
3. Scope resolution operator::
4. Conditional operator ?:
5. Sizeof operator sizeof

52. What is abstraction?

Soln: Abstraction is of the process of hiding unwanted details from the user.

53. What is container class?

Soln: container class is a class that is used to hold objects in memory or external storage. A container class acts as a generic holder. A container class has a predefined behavior and a well-known interface.

54. Can a constructor be overloaded?

Soln: Yes, the constructor can be overloaded to pass different arguments to the object at the time of creation.

55. Can a destructor be overloaded?

Soln: No, There is no need to overload the destructor as it is called before deallocating an object.

56. What is static and dynamic binding?

Soln:The process of connecting the function call to a function implementation is called binding.When the binding happens before the execution (by compiler) of the program, it is called static or early binding.If the binding happens at runtime, it is called late binding or dynamic binding.

57. What is difference between Checked Exception and Unchecked Exception?

Soln: 1) Checked Exception:

The classes that extend Throwable class except RuntimeException and Error are known as checked exceptions e.g.IOException,SQLException etc. Checked exceptions are checked at compile-time.

2) Unchecked Exception:

The classes that extend RuntimeException are known as unchecked exceptions e.g. ArithmeticException,NullPointerException etc. Unchecked exceptions are not checked at compile-time.

58. What is the base class for Error and Exception?

Soln:Throwable.

59. What is the main difference between Java platform and other platforms?

Soln:The Java platform differs from most other platforms in the sense that it's a software-based platform that runs on top of other hardware-based platforms.It has two components:

1. Runtime Environment
2. API(Application Programming Interface)

60. What gives Java its 'write once and run anywhere' nature?

The bytecode. Java is compiled to be a bytecode which is the intermediate language between source code and machine code. This bytecode is not platform specific and hence can be fed to any platform.

61. What is JIT compiler?

Soln:Just-In-Time(JIT) compiler:It is used to improve the performance. JIT compiles parts of the bytecode that have similar functionality at the same time, and hence reduces the amount of time needed for compilation.Here the term “compiler” refers to a translator from the

instruction set of a Java virtual machine (JVM) to the instruction set of a specific CPU.

62. Is Empty .java file name a valid source filename?

Soln:Yes, save your java file by .java only, compile it by javac .java and run by java your class name Let's take a simple example:

```
1. //save by .java only
2. class A{
3. public static void main(String args[]){
4. System.out.println("Hello java");
5. }
6. }
7. //compile by javac .java
8. //run by     java A
```

compile it by javac .java
run it by java A

63. What is an abstract class?

Soln: An abstract class can not be instantiated means objects can not be created for an abstract class.

A class is made abstract by declaring one or more of its virtual functions to be pure.

A pure virtual function is one with an initializer of =0 in its declaration.

virtual void func()=0; //Pure virtual function.

64. How does a C++ class differ from a C++ structure?

Soln:

Structure	Class
1. Default access is public	1. Default access is private
2. Default inheritance is public	2. Default inheritance is private

65. What is mutable keyword? when do you use it?

Soln: The presence of the mutable keyword indicates that the data member of a class may be safely changed within a const member function.Mutable could be used as workaround solution for a design bug.

```
class A
{
private:
int i;
mutable int j;
public:
void get() const
{
i=20;  // not allowed
j=30; // allowed
}
};
```

66. What are the mutators and accessors in a class?

Soln: Mutators are the method in a class that are used to set the state of of an object.

Accessors are the method in a class that are used to get the state of an object. In C++ accessors functions need not be declared as const methods.

67. What is the advantage of using templates?

Soln: Templates provide a means to write generic functions and classes for different data types.Templates are sometimes called ‘parameterized ‘ types.Templates can significantly reduce source code size and increase code flexibility without reducing type safety.

68. What is function template?

Soln: Function template provides a means to write generic functions for

different data types like integer,float,long or user defined objects.

```
template <class T>
T GetMaxValue(T a,T b)
{
T result;
result=a>b?a:b;
return(result);
}
int main()
{
int i=5,j=6,k;
float l=10.1,m=5.2,n;
K=GetMaxValue<int>(i,j);
n=GetMaxValue<float>(l,m);
cout<<" Max integer value"<<k<<endl;
cout<<"Max float value"<<n<<endl;
return 0;
}
```

69. Can a function be overloaded based on return type?

Soln: Function signature does not depend on the return type.So, overloading can not be resolved by the return type alone.

70. What is virtual function?

Soln: Polymorphism refers to the property by which objects belonging to different classes are able to respond to the same message,but in different forms.

Example:

```
class base
```

```
{
public:
 void display(){ cout<<"\n display base"; }
virtual void show() { cout<<"\n show derived";
}
};
class derived: public base
{
public:
void display(){ cout<<"\n display derived"; }
void show() { cout<<"\n show derived";
}
};
int main()
{
base B;
derived D;
base *bptr;
bptr=&B;
bptr->display();
bptr->show();
bptr=&D;
bptr->display();
bptr-> show();
return 0;
}
```

71. Why friend function is used?

Soln: Friend function is used

1) To access the private data of a class from a non member function.

2) To increase the versatility of overloaded operators.

72. What is instance variable?

Soln:In object-oriented programming, an **instance variable** is a variable defined in a class (i.e. a member variable), for which each object of the class has a separate copy, or instance.

73. What is copy constructor?

Soln: The copy constructor initializes one object by another object.An argument for a copy constructor is a reference to an object of the same class.The syntax for copy constructor declation is as follows:

Syntax:

```
class name :: class name(class name &variable)
{
Body of the constructor
}
```

74. What is the difference between a "assignment operator" and a "copy constructor"?

Soln: In assignment operator, you are assigning a value to an existing object. But in copy constructor, you are creating a new object and then assigning a value to that object. For example:

```
complex c1,c2;
c1=c2; //this is assignment
complex c3=c2; //copy constructor
```

75. Do we require parameter for constructors?

Soln:No, we do not require parameter for constructors.

76. What is destructor?

Soln: Destructor is a method which is automatically called when the object is made of scope or destroyed. Destructor name is also same as class name but with the tilde symbol before the name.

77. What are the differences between inheritance and abstraction?
Soln: The differences between inheritance and abstraction are-
1. Abstraction solves the problem at design level while encapsulation solves the problem at implementation level
2. Abstraction is used for hiding the unwanted data and giving relevant data. while Encapsulation means hiding the code and data into a single unit to protect the data from outside world.
3. Abstraction lets you focus on what the object does instead of how it does it while Encapsulation means hiding the internal details or mechanics of how an object does something.
4. For example: Outer Look of a Television, like it has a display screen and channel buttons to change channel it explains Abstraction but Inner Implementation detail of a Television how CRT and Display Screen are connected with each other using different circuits , it explains Encapsulation.

78. What is concrete class?
Soln: A class having object is known as concrete class.

79. What are the differences between C++ and Java?
Soln:

Java	**C++**
1.Java does not support Operator Overloading	1. C++ supports Operator Overloading.
2. Java does not use pointers.	2. C++ uses pointer.
3. Java does not have template classes.	3. C++ does have template classes
4. Java does not support global Variables.	4. C++ supports global variables.
5. Java does not support multiple inheritance of classes.This is accomplished using a new	5. C++ supports multiple inheritance of classes.

feature known as Interface.

6.There are no header files in Java	5.C++ does have header files.

General Questions and Answers

1. Introduce yourself.

Soln: I am Pranab Ganguly.I am 25 years old.I passed the Madhyamik examination from Motijil High School obtaining 81% marks in 2005 and H.S examination from the same school securing 75% marks in 2007.Then I got a chance in Joint Entrance and took admission in Engineering.I completed B.Tech in IT from Institute of Engineering and Management in 2011 securing DGPA 7.81.I qualified in GATE 2011 in Computer Science with score 336. I completed M.Tech in IT from Rajabazar Science College securing CGPA 7.6 in 2013.Currently I have been working in Narula Institute of Technology as an Assistant Professor since 1.7.2013. I want to utilize my skills and abilities in any institute that offers professional growth while being resourceful,innovative and flexible.My career objective is to become a professor.I have come of a middle class family

at Dumdum in Kolkata.My father is a businessman and my mother is a housewife.I have excellent leadership skills which I have acquired through effective combination of communication,delegation and personal interaction.I am good,adaptive,disciplined and beleive in team work.I am a quick learner with a positive attitude.I never compromise something what is wrong.I am very passionate about whatever I do,brings best out of me.I am honest.I try to be different from other persons.I can not leave any of my tasks until it completes.Sometimes I forget about my sleep.I want to do Phd in future during my service life.I like OS,DBMS,Networking,Software Engineering and Programming languages like C,Java,C++,Oracle,PHP etc.I did my final year project Online Rural Development under the guidance of Soumen Bhowmick using frontend ASP.net and backend Sql Server.I did my final year thesis on Adhoc Network Security under the guidance of Gourav Chakraborty.I want to help the people who are in distress.I respect my parents very much.

2. Tell us something about your family background.
Soln: I have come of a middle class family at Dumdum in Kolkata.My father is a serviceman and my mother is a home maker.My sister who has completed M.Sc in mathematics is a school teacher in Belgharia high school.I myself completed M.Tech in IT from Rajabazar Science College in 2013 and have been working as an Assistant Professor in IT in Narula Institute Of Technology. My uncle who works as a software developer in USA inspired me very much to be an Engineer.I respect my parents very much.My relationship with all the members in our family is very good.

3. What is the difference between Science and Technology?
Soln: Science is the accumulation of knowledge and technology is the application of that knowledge.

4. What are Difference Between Engineering and Technology and science?

Soln: Science - Specific knowledge about a subject.
Engineering - Specific application of Science.
Technology - Specific conceptual application of Engineering.

5. What are the differences between engineering and Technology?

Soln: Engineering is a field of study, technology is application based upon science and technology. We know that science is knowledge or understanding about a subject or phenomenon of natural world. It is a knowledge based upon logic and experimentation that is verifiable. Example of science would be study of Nuclear Physics.

Engineering is both a field of study as well as application of knowledge (scientific) to create or produce something such as products and something structural. If some principles and methods of a science subject such as Nuclear Physics are used to make a structure such as a Nuclear reactor, the reactor would be called an example of engineering.

Technology is also an application of knowledge gained through science and engineering fields to make or produce complex structures. Examples of technology would be parts of latest appliances and complex applications.

6. What is the difference between Computer science and information Technology?

Soln: The differences between computer science and IT are-

i) Computer science refers to the processes used to create usable computer programs and applications together with all theory behind those processes. Information technology on the other hand refers to the application of computer programs to solve business processes. It is the application of technology in business.

ii) Computer Science is at lower level whereas Information Technology is at higher level in computing terms.

iii) Information Technology integrates computer science into the business

world for automated solutions.

7. Why IT?
Soln: To make my career best.

8. What are your strengths and weakness?
Soln: **Strengths:**

i) I am good adaptive,disciplined and believe in team-work.
ii) I am a quick learner with positive attitude.
iii) I am being very passionate about whatever I do,brings best out of me.
iv) I have much patience and confidence to perform a task.

Weakness:

i) I try to be different from other persons.
ii) I can not leave any of my tasks until it completes.Sometimes I forget about my sleep.

9. Why do you like to work as an Assistant professor?
Soln: i) I like education very much.I want to do further studies like Phd.
ii) I want to make future engineers.

10. What is career objective?
Soln: I want to utilize my skills and abilities in any institute that offers professional growth.

11. Why TCS?
Soln: TCS is a very good MNC where I can utilize my skills and abilities that will offer professional growth.It is a CMM level 5 company.

12. Where did you visit last?Tell us something about your visit.

Soln: I visited last Marina beach in Chennai.I put up there in a hotel for 3 days.It is one of the largest beach in Aria.I was really overwhelmed by the enchanting scenarios of this beach.I would bathe everyday in the bay of bengal.I can not forget this beach.I have decided after my returning I will go there every year.

13. What is IT?

Soln: Information Technology is the technology required for information processing.

The work done by IT Engineers are mainly for management of information.

14. What you have learned from your mistakes?

Soln: Great things are learned by mistakes. If you do not commit mistakes you will not learn new things.I take risks to ensure that work is done.If I failed then it is a mistake.I can concentrate on the mistakes to recover it as soon as I can and I will gain knowledge from that so I can suggest it to my workers also.From my childhood I have learned so many things how to take risks.I have learnt how to respond when problem suddenly happens, problem solving techniques,confidence etc.It makes me a successful person in life.

15. Are you a hard worker or smart worker?

Soln: My studies and experiences are telling that I am a hard worker.However I am ready to learn how to work smartly.But for the job IQ is not the only factor.Interacting with people,solving business problems and making decisions related to the job are important. According to me both hard work and smart work are interrelated and necessary for the job.

16. Do you work well under pressure?

Soln: Definitely, positive pressure makes me so responsible towards work. I will work to the best of my ability.But when I am under negative

pressure I do not feel insecure. My experience as a sportsperson will help me to get over it. I have sportive spirit and I get out of pressure.
I can manage the pressure. I will find out an alternative resource which is useful and share work to get things done in time for any cause.
According to me to be a best worker means work to be done in time under any circumstances.

17. What do other people think at the way you work?
Soln: It has been always positive. The feedback from my superiors is favourable. I usually consult them for solving doubts without any hesitation. They have praised me so many times because of dedication to the work. Even my co-workers give the respect followed with a pleasant smile. Whenever I notice it I feel happy.

18. Will you be able to cope with a change in work environment?
Soln: Definitely, I like challenges. I can mingle with anyone because of my friendly nature. I will think that I am changing from one family to another family to achieve new goals. I can easily adapt myself to the new work environment.

19. Who is good software engineer?
Soln: 1) Familiarity with software engineering principles.
2) Good technical knowledge of project areas.
3) Good programing abilities.
4) Good communication skills like oral, written and interpersonal skill.
5) High motivation.
6) Sound knowledge of fundamentals of computer science.
7) Intelligence.
8) Ability to work in a team.
9) Discipline.

20. Tell us something about your favourite teacher.
Soln: My favourite teacher is Subham Chakraborty.He is an English

teacher.He is very punctual,affectionate,disciplined.His way of teaching was excellent.He is different from other teachers.All the students in the class would respect him very much.All the students would listen to his class attentively.

21. Do you have any questions from us?
Soln: Yes.I have two questions
Firstly, If I get selected what are the subjects I have to learn?
Secondly,If I get selected where my training will be held?

22. Why should I hire you?
Soln: As a fresher I need a platform to prove my ability. If I will be a part of your organization I'll put my effort and strength to uplift your organization. None is born with experience, if you hire me I will get professional experience through your company.

23. Are you willing to relocate or travel?
Soln: I don't have any issues in relocation. I am ready to relocate or travel. Because if I relocate means it will give exposure to me and also I can interact with different people of different culture. I can experience new things from different people.

24. What are your goals?
Soln:My current goal is to be part of your company and my future goal is to grow in your company.

25. Can you work under pressure?
Soln: If we love the work we do we will never feel pressure. We will search for happiness in that pressure too.

26. Why do you want to work for this organization?
Soln:According to me success is an outcome of knowledge, intelligence

and application.Whatever I have learned, unless and until I will apply that somewhere, I am not going to get succeed. So I think that this is the right place where my skills and knowledge will be appreciated which would ultimately lead to the growth of an organisation and that is the reason why I want to join this organisation.

27. What motivates you to do good job?

Soln:I feel that good job means where you find good culture and good working environment & which you do satisfactorily, enthusiastically and confidently with high spirit of excellency. Therefore I would like to state that I am highly motivated by my confidence to excel in my life. It is obvious for some people the motivation is required but for some others their confidence is sufficient.i.e they are self starters and I believe that I am a self starter to do a good job.

28. Briefly describe your ideal job.

Soln: My Ideal job

i)A job that allows me to grow in the organization

ii) A job where i can make a positive contribution to the growth of the firm

iii)A job where i am comfortable with my co-workers

iv) A job that pays a decent salary

v) A job that is so interesting that i am motivated to continue educating myself to be the best that i can be in the field.

29. How long would you expect for us if hired?

Soln: Wherever there is a chance of growth in career and my skills I don't want to move to another organisation. If you fulfill my needs I want to commit myself for the long term to develop myself along with the organisation.

30. What qualities do you look for in a boss?

Soln:He should have a positive attitude, caretaking person, try to understand and solve the employee's problems. He Should appreciate the work done by an employee even if it is trivial.By doing so, the quality of work by that employee will be raised.

31. Tell me about your dream job.
Soln.A job in a result oriented organization which is challenging and satisfies me a well as organizational goals is my dream job.

32. Why do you think you are the best candidate?
Soln:As I have potential to work hard and give better growth to the organisation financially as well as in achieving targets.