MD. SHOHEL MOJUMDER

University of Dhaka
Institute of Information Technology
Master of Information technology, 2013
MITM 304 DBMS
Marks: 70 Times: 2 hours.

1 (a) Consider a B+-tree with N = 100 over a relation with 1 million records. What is the number of nodes in the tree that we have to examine when searching for a record? 2

(b) Consider constructing a B+tree of order 3 (i.e., n =3, each index node can hold n keys and n+1 pointers). 4
Show the resulting tree after inserting keys 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, in this order. 4

(c) Explain data cube with an example.

2 (a) Consider two relations R(A, B, C, D) and S (D, E) with the following statistics: T (R) = 100, V (R, A) = 100, V (R, B) = 10, V (R, C) = 1, V (R, D) = 50; T (S) = 500, V (S, D) = 30, V (S, E) = 100.
(i) Estimate the number of tuples in $\sigma_{(B=50)AND(C=300)}(R)$ 1
(ii) Estimate the number of tuples in $\sigma_{(B>25)AND(B=15)}(R)$ 1
(iii) Estimate the number of tuples in R |X| S 2

(b) List possible types of failure in a distributed system and explain 2PC protocol to handle transaction atomicity despite the failures. 4

(c) Consider a relation that is fragmented horizontally by plant-number: 2
employee (name, address, salary, plant-number)
Assume that each fragment has two replicas: one stored at the Dhaka site and one stored locally at the plant site. Describe a good processing strategy for the following queries entered at the Chittagong site.
i. Find all employees at the abc plant.
ii. Find the average salary of all employees

3 (a) Write a serial schedule for the following 2
Let T_1 transfer \$50 from A to B, and T_2 transfer 10% of the balance from A to B.

(b) For each of the following schedule:
w3(A); r1(A); w1(B); r2(B); w2(C); r3(C);
r1(A); r2(A); w1(B); w2(B); r1(B); r2(B); w2(C); w1(D);
r1(A); r2(A); r1(B); r2(B); r3(A); r4(B); w1(A); w2(B);
Answer the following questions:
(i) What is the precedence graph for the schedule? 3
(ii) Are these schedules conflict-serializable? If so, what are all the equivalent serial schedules? 1.5

(c) A database has four elements, A, B, C, and D. Assume that the following is a normal sequence of undo log records, using non-quiescent checkpointing:

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Master in Information Technology (MIT), 2013
Mid-term -2
Marks: 20 Times: 50 minutes.

1 After a system crash, the redo-log using non-quiescent checkpointing contains the following data:

< START T1 >	< COMMIT T1 >	< T4, G, 15 >
< T1, A, 10 >	< START CKPT ???? >	< END CKPT >
< START T2 >	< START T4 >	< COMMIT T3 >
< T2, B, 5 >	< T2, E, 5 >	< START T5 >
< T1, C, 7 >	< COMMIT T2 >	< T5, H, 3 >
< START T3 >	< T3, F, 1 >	< START CKPT ???? >
< T3, D, 12 >		< COMMIT T5 >

(a) What are the correct values of the two <START CKPT ????> records? You have to provide two correct values for the two ????s.
(b) Indicate and explain what fragment of the log the recovery manager needs to read. 3
(c) Assuming that the two < START CKPT ??? > records are correctly stored in the log, according to your answer above, show which elements are recovered by the redo recovery manager and compute their values after recovery. 2 2
(d) List the ACID properties and explain one of them. 3

2 (a) For each of the three partitioning techniques, namely round-robin, hash partitioning, and range partitioning, give an example of a query for which that partitioning technique would provide the fastest response. 3
(b) Describe the benefits and drawbacks of pipelined parallelism. 2
(c) Explain Fragment and replicate join. 3
(d What form of parallelism (interquery, interoperation, or intraoperation) is likely to be the most important for increasing the throughput of a system with many small queries 2

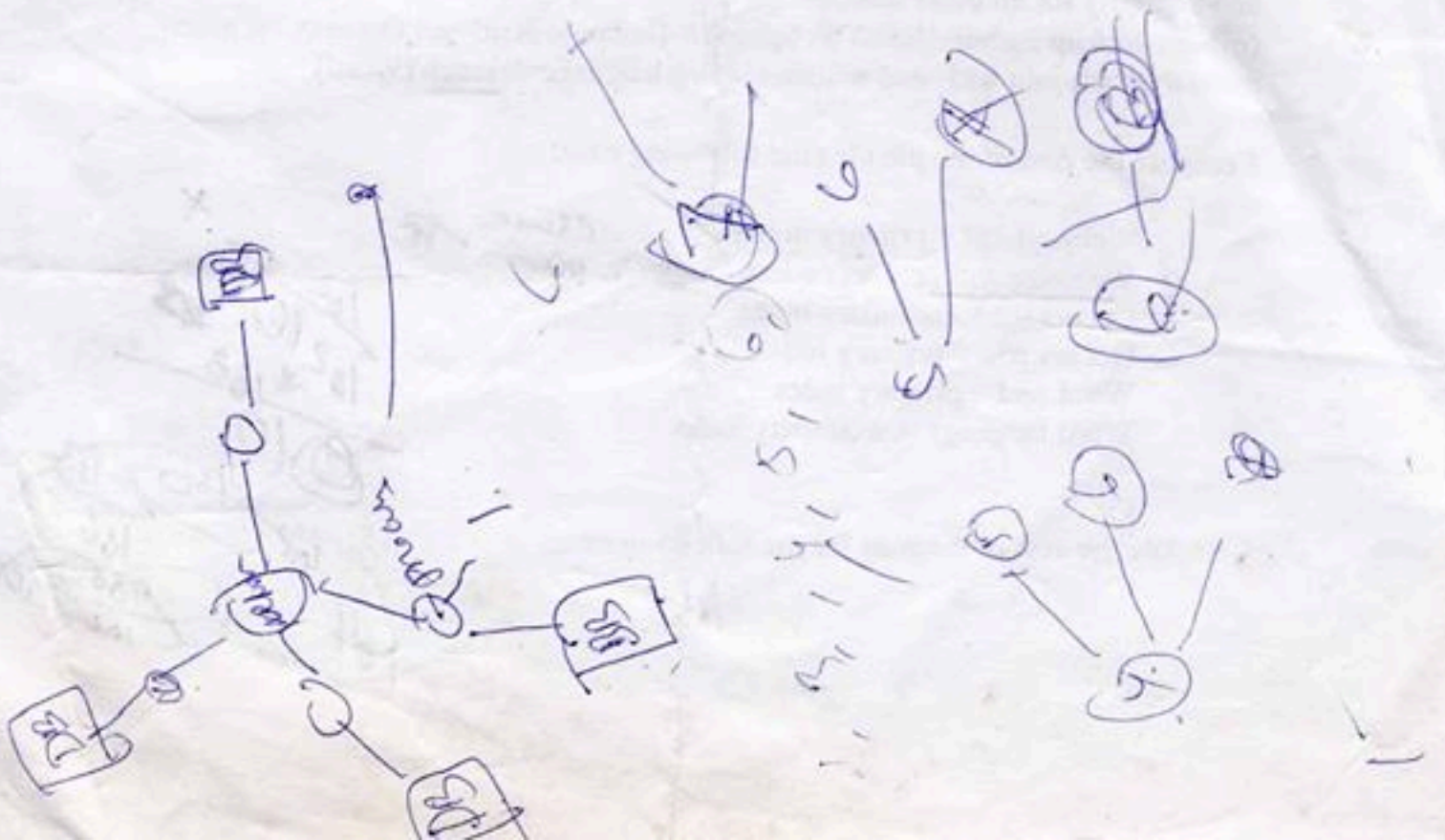
Webpage.url = secondary index
Webpage.author = primary index
Occurs.url = primary index
Occurs.wid = secondary index
Word.wid = secondary index
Word.language = primary index

3 Consider relations $r(A,B)$ and $s(B,C)$. Assume that r contains 2000 tuples, and that s contains 5000 tuples.
We want to compute $v = r$ JOIN $_{r.B=s.B}$ s.

(a) Without any further assumptions, what is the maximum number of tuples that v may contain? 2

(b) Now assume that we know that $V(B, r) = 500$. (That is, in r the attribute B takes on 500 different values.) What is now a reasonable estimate on the size of v? 2

(c) Finally, assume we know that s satisfies the functional dependency B -> C. What is now a reasonable estimate on the size of v? 1



University of Dhaka
Institute of Information Technology
Master in Information Technology, 2014
DBMS-II
Marks: 20 Times: 1 hour.

1 (a) Consider constructing a B+ tree (here, n = 3, each index node can hold n keys and n+1 pointers).Show the resulting tree after inserting keys 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. 5

(b) Construct a B+ tree for n=4 and for the following set of key values 5
3, 7, 8, 9, 10, 12, 15, 19, 21, 23, 24, 26, 27, 29, 32, 35, 40, 50, 51, 52.
Assume that the keys are inserted one by one in the order of their appearance in the list.

2 Consider the following database about word occurrences in Webpages:

Webpage(url, author)
Occurs(url, wid)
Word(wid, text, language)

where:

Webpage.url and Word.wid are keys.
Occurs.url and Occurs.wid are foreign keys to Webpage and Word respectively.

Assume the following statistics

T(Webpage) = V (Occurs; url) = 10^9
T(Occurs) = 10^{12}
T(Word) = V (Occurs; wid) = 10^6
V (Webpage; author) = 10^7
V (Word; language) = 100

Assume ten records can be fit in one block, hence B(Webage) = T(Webpage)=10 and similarly for all other tables.

(σindex-lookup author='John'(Webpage) ⋈index-join url=url Occurs) ⋈ main-memory-hash-join wid=wid σindex-lookup language='French'(Word)

Compute the cost of the plan for the following case: 5

Webpage.url = primary index
Webpage.author = secondary index
Occurs.url = secondary index
Occurs.wid = primary index
Word.wid = primary index
Word.language = secondary index

Or

Compute the cost of the plan for the following case:

1	<start T1>	6	<start T3>	12	<T4,C,7>
2	<T1,B,40>	7	<commit T1>	13	<T3,A,22>
3	<start T2>	8	<T3,B,12>	14	<commit T4>
4	<T2,A,56>	9	<commit T2>	15	<T3,A,99>
5	<T2,C,34>	10	<T3,D,89>	16	<commit T3>
		11	<start T4>		

(i) Suppose we start checkpointing right after Log 5, indicate where and what the start check-pointing record would look like. Then, indicate where and what the earliest end checkpoint record would look like. 1.5

(ii) Continue from (i). Suppose the system crashes right after Log 14 and the end checkpoint has been written out to disk. What is the content of the earliest log line we must examine? And which transaction records do we need to undo in sequence? 2

4 (a) Describe parallel external sort merge algorithm 2

(b) What factors could result in skew when a relation is partitioned on one of its attributes by: 4

i. Hash partitioning
ii. Range partitioning

In each case, what can be done to reduce the skew?.

(c) For each of the three partitioning techniques, namely round-robin, hash partitioning, and range partitioning, give an example of a query for which that partitioning technique would provide the fastest response. 4

Bonus question: The obtained number of this question might be helpful to upgrade a grade only that you achieve from the aforementioned five questions.

B1 Consider indexing the following key values using an extensible hash table. Keys are inserted in the following order:

34, 60, 51, 73, 49, 84, 25

The hash function h(n) for key n is h(n) = n mod 16; that is, the hash function is the reminder after the key value is divided by 16, giving the hash a 4-bit value. Assume that each bucket can hold 2 data items.

(a) Draw a hash table, which contains both the array of pointers in main memory and the buckets (i.e., data blocks) in secondary storage, after the first four keys are inserted. Show the keys along with their hash values in the buckets. Be sure to indicate the number of bits in the hash value that are used in the array. 5

(b) Suppose that we use a linear hash table instead. Draw a hash table in the similar way, after the first five keys are inserted. 5

(a) Consider an indexed sequential file consisting of 10,000 blocks. Each block contains 10 fixed sized records. Each key value found in the file is unique. For this problem, assume that:

- Pointers to blocks are 10 bytes long.
- Pointers to records are 20 bytes long.
- Index blocks are 5000 bytes (in addition to the header).
- Search keys for file records are 10 bytes long.

(i) How many blocks do we need to hold a sparse one-level, primary index?

(ii) Suppose you now construct a one-level, dense secondary index. Compute its minimum size in blocks.

(b) Consider two relations R(A, B, C, D) and S (D, E) with the following statistics: T (R) = 100, V (R, A) = 100, V (R, B) = 10, V (R, C) = 1, V (R, D) = 50; T (S) = 500, V (S, D) = 30, V (S, E) = 100.

(i) Estimate the number of tuples in $\sigma_{B=25}(R)$

(ii) Estimate the number of tuples in $\sigma_{(B=25)AND(C=30)}(R)$

(iii) Estimate the number of tuples in $\sigma_{B>25}(R)$

(iv) Estimate the number of tuples in $\sigma_{(B>25)AND(B=15)}(R)$

(v) Estimate the number of tuples in R |X| S

A database has four elements, A, B, C, and D. Assume that the following is a normal sequence of undo log records, using non-quiescent checkpointing:

1	<start T1>	6	<start T3>	12	<T4,C,7>
2	<T1,B,40>	7	<commit T1>	13	<T3,A,22>
3	<start T2>	8	<T3,B,12>	14	<commit T4>
4	<T2,A,56>	9	<commit T2>	15	<T3,A,99>
5	<T2,C,34>	10	<T3,D,89>	16	<commit T3>
	<ckpt>	11	<start T4>		

(i) When is the latest time for transaction T1, T2 that "dirty data" can be flushed onto disk (ie, the time Output(X) for data X can be performed)?

(ii) Suppose we start checkpointing right after Log 5, indicate where and what the start check-pointing record would look like. Then, indicate where and what the earliest end checkpoint record would look like.

(iii) Continue from (b). Suppose the system crashes right after Log 14 and the end checkpoint has been written out to disk. What is the content of the earliest log line we must examine? And which transaction records do we need to undo in sequence?

“ *Computers are good at following instructions, but not at reading your mind.* ” - Donald Knuth

1. What is the output of this program?

```
#include<stdio.h>
int main()
{
        char *ptr;
        char string[] = "How are you?";
        ptr = string;
        ptr += 4;
        printf("%s",ptr);
        return 0;
}
```

(a) How are you?
(b) are you?
(c) are
(d) No output

2. Which of the following will print the value 2 for the above code?

```
#include<stdio.h>
int main()
{
        int a[10][20][30] = {0};
        a[5][2][1] = 2;

        return 0;
}
```

(a) printf("%d",*(((a+5)+2)+1));
(b) printf("%d",***((a+5)+2)+1);
(c) printf("%d",*(*(*(a+5)+2)+1));
(d) None of these

3. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        int a = 5;
        int b = ++a * a++;
        printf("%d ",b);
        return 0;
}
```

(a) 25
(b) 30
(c) 36
(d) Undefined Behavior

4. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        int a = 5;
        switch(a)
        {
                default:
                        a = 4;
                case 6:
                        a--;
                case 5:
                        a = a+1;
                case 1:
                        a = a-1;
        }
         printf("%d \n",a);
        return 0;
}
```

(a) 5
(b) 4
(c) 3
(d) None of these

5. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        int a = 2,b = 5;
        a = a^b;
        b = b^a;
        printf("%d %d",a,b);
        return 0;
}
```

(a) 5 2
(b) 2 5
(c) 7 7
(d) 7 2

6. What is the output of the following program?

```
#include <stdio.h>
int main()
{
```

```
        int a[][3] = {1, 2, 3, 4, 5, 6};
        int (*ptr)[3] = a;
        printf("%d %d ", (*ptr)[1], (*ptr)[2]);
        ++ptr;
        printf("%d %d\n", (*ptr)[1], (*ptr)[2]);
        return 0;
}
```

(a) 2 3 5 6
(b) 2 3 4 5
(c) 4 5 0 0
(d) none of the above

7. What is the output of the following program?

```
#include <stdio.h>
void f(char**);

int main()
{
        char *argv[] = { "ab", "cd", "ef", "gh", "ij", "kl" };
        f(argv);
        return 0;
}
void f(char **p)
{
        char *t;
        t = (p += sizeof(int))[-1];
        printf("%s\n", t);
}
```

(a) ab
(b) cd
(c) ef
(d) gh

8. What is the output of the following program?

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

int ripple(int n, ...)
{
        int i, j, k;
        va_list p;
        k = 0;
        j = 1;
        va_start(p, n);
        for (; j < n; ++j)
```

```
        {
                i = va_arg(p, int);
                k += i;
        }
        va_end(p);
        return k;
}
int main()
{
        printf("%d\n", ripple(3, 5, 7));
        return 0;
}
```

(a) 12
(b) 5
(c) 7
(d) 15

9. What is the output of the following program?

```
#include <stdio.h>
int counter(int i)
{
        static int count = 0;
        count = count + i;
        return count;
}

int main()
{
        int i, j;
        for (i = 0; i <= 5; i++)
                j = counter(i);
        printf("%d\n", j);
        return 0;
}
```

(a) 10
(b) 15
(c) 6
(d) 7

10. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        const int x=5;
        const int *ptrx;
```

```
        ptrx = &x;
        *ptrx = 10;
        printf("%d\n", x);
        return 0;
}
```

(a) 5
(b) 10
(c) Compile Error
(d) Garbage value

11. What is the output of the following program?

```
#include<stdio.h>
#define x 4+1
int main()
{
        int i;
        i = x*x*x;
        printf("%d",i);
        return 0;
}
```

(a) 125
(b) 13
(c) 17
(d) None of above

12. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        char c=125;
        c=c+10;
        printf("%d",c);
        return 0;
}
```

(a) 135
(b) +INF
(c) -121
(c) -8

13. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        int i=10;
        static int x=i;
```

```
        if(x==i)
                printf("Equal");
        else if(x>i)
                printf("Greater");
        else
                printf("Lesser");
        return 0;
}
```

(a) Equal
(b) Greater
(c) Lesser
(d) Compile Error

14. Consider the following code segment:

```
#include <stdlib.h>

int *f1()
{
        int x = 10;
        return &x;
}
int *f2()
{
        int *ptr;
        *ptr = 10;
        return ptr;
}
int *f3()
{
        int *ptr;
        ptr = (int*) malloc(sizeof (*ptr));
        return ptr;
}
```

Which of these functions uses pointers incorrectly?

(a) f3 only
(b) f1 and f3
(c) f1 and f2
(d) f1, f2, and f3

15. What is the output of the following program?

```
#include <stdio.h>
int main()
{
        int i = 3;
        int j;
```

```
        j = sizeof(++i + ++i);
        printf("i=%d j=%d\n", i, j);
        return 0;
}
```

(a) i=4 j=4
(b) i=3 j=4
(c) i=5 j=4
(d) the behavior is undefined

16. What is the output of the following program?

```
#include <stdio.h>
void f1(int*, int);
void f2(int*, int);
void (*p[2])(int*, int);

int main()
{
        int a = 3;
        int b = 5;
        p[0] = f1;
        p[1] = f2;
        p[0](&a, b);
        printf("%d %d ", a, b);
        p[1](&a, b);
        printf("%d %d\n", a, b);
        return 0;
}

void f1(int *p, int q)
{
        int tmp = *p;
        *p = q;
        q = tmp;
}
void f2(int *p, int q)
{
        int tmp = *p;
        *p = q;
        q = tmp;
}
```

(a) 5 5 5 5
(b) 3 5 3 5
(c) 5 3 3 5
(d) none of the above

17. What is the output of the following program?

```
#include <stdio.h>
void e(int);

int main()
{
        int a = 3;
        e(a);
        putchar('\n');
        return 0;}
void e(int n)
{
        if (n > 0)
        {
                e(--n);
                printf("%d ", n);
                e(--n);
        }
}
```

(a) 0 1 2 0
(b) 0 1 2 1
(c) 1 2 0 1
(d) 0 2 1 1

18. Consider the following code segment:

```
typedef int (*test)(float*, float*);
test tmp;
```

What is the type of tmp?

(a) function taking two pointer-to-float arguments and returning pointer to int
(b) pointer to int
(c) pointer to function taking two pointer-to-float arguments and returning int
(d) none of the above

19. What is the output of the following program?

```
#include <stdio.h>

int main()
{
        char p;
        char buf[10] = {1, 2, 3, 4, 5, 6, 9, 8};
        p = (buf + 1)[5];
        printf("%d\n", p);
        return 0;
}
```

(a) 5
(b) 6
(c) 9
(d) none of the above

20. What is the output of the following program?

```
#include <stdio.h>
int main()
{
        struct node
        {
                int a;
                int b;
                int c;
        };
        struct node s = { 3, 5, 6 };
        struct node *pt = &s;
        printf("%d\n", *((int*)pt+1));
        return 0;
}
```

(a) 3
(b) 5
(c) 6
(d) 7

21. What is the output of the following program?

```
#include <stdio.h>
int main(void)
{
        char a[5] = { 1, 2, 3, 4, 5 };
        char *ptr = (char*)(&a + 1);
        printf("%d %d\n", *(a + 1), *(ptr - 1));
        return 0;
}
```

(a) Compile Error
(b) 2 1
(c) 2 5
(d) none of the above

22. What is the output of the following program?

```
#include <stdio.h>
void foo(int[][3]);

int main(void)
{
        int a[3][3] = { {1, 2, 3}, {4, 5, 6}, {7, 8, 9} };
        foo(a);
```

```
        printf("%d\n", a[2][1]);
        return 0;
}

void foo(int b[][3])
{
        ++b;
        b[1][1] = 9;
}
```

(a) 8
(b) 9
(c) 7
(d) none of the above

23. Consider the following function:

```
int foo(int x, int n)
{
        int val = 1;
        if (n > 0)
        {
                if (n % 2 == 1)
                val *= x;
                val *= foo(x * x, n / 2);
        }
        return val;
}
```

What function of x and n is computed by foo?
(a) x^n
(b) x×n
(c) nx
(d) none of the above

24. What is the output of the following program?

```
#include<stdio.h>

int main()
{
        int a = 0;
        switch(a)
        {
                default:
                        a = 4;
                case 6:
                        a--;
                case 5:
                        a = a+1;
                case 1:
```

```
                        a = a-1;
        }
         printf("%d \n",a);
        return 0;
}
```

(a) 5
(b) 4
(c) 3
(d) 0

25. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        int a = 2;
        if(a == (1,2))
                printf("Hello");
        if(a == 1,2)
                printf("World");
        return 0;
}
```

(a) Hello
(b) World
(c) Hello World
(d) Compile Error

26. What is the output of the following program?

```
#include<stdio.h>
int main()
{
        int a = 1,2;
        int b = (1,2);
        if(a == b)
                printf("Equal");
        else
                printf("Not Equal");
        return 0;
}
```

(a) Equal
(b) Not Equal
(c) Compiler Dependent
(d) Compile Error

27. What is the output of the following program?

```
#include<stdio.h>
void foo(char *);
```

```
int main()
{
        char *string = "Hello";
        foo(string);
        printf("%s",string);
        return 0;
}

void foo(char *a)
{
        while(*a)
        {
                *a += 1;
                a++;
        }
}
```

(a) Hello
(b) Ifmmp
(c) Compile Error
(d) Segmentation fault

28. What is the output of the following program?

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
        char s[] = "Opendays2012";
        int i = 0;
        while(*(s++))
                i++;
        printf("%d",i);
        return 0;
}
```

(a) Segmentation Fault
(b) Compile Error
(c) 12
(d) 0

29. What is the output of the following program?

```
#include<stdio.h>
int a = 10;
int main()
{
        fun();
        fun();
        return 0;
}
```

```
int fun()
{
        static int a = 1;
        printf("%d ",a);
        a++;
        return 0;
}
```

(a) 1 2
(b) 1 1
(c) 10 11
(d) 10 10

30. What is the output of the following program?

```
#include <stdio.h>
#define crypt(s,t,u,m,p,e,d) m##s##u##t
#define begin crypt(a,n,i,m,a,t,e)
int begin()
{
        printf("Hello\n");
        return 0;
}
```

(a) Hello
(b) Link error
(c) Segmentation fault
(d) Compiler error

31. Consider the following program:

```
#include<stdio.h>
int main()
{
        int a[10][20][30]={0};
        printf("%ld",&a+1 - &a);
        return 0;
}
```

What is the output of this program?
Ans:

32. Consider the following program:

```
#include<stdio.h>
int main()
{
        int a[10][20][30] = {0};
        int *b = a;
        int *c = a+1;
```

```
        printf("%ld", c-b);
        return 0;
}
```

What is the output of this program?
(You may ignore compiler warnings)

Ans:

33. Consider the following program:

```
#include<stdio.h>
#include<stdlib.h>
int* fun();

int main()
{
        int *a = fun();
        printf("%d",*a);
        return 0;
}
int* fun()
{
        int *a =(int*) malloc(sizeof(int));
        *a = 10;
        return a;
}
```

What is the output of this program?
Ans:

34. Consider the following program:

```
#include<stdio.h>
int main()
{
        int *a = fun();
        printf("%d",*a);
        return 0;
}
int fun()
{
        int a = 10;
        return a;
}
```

What is the output of this program?
Ans:

35. Consider the following program:

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

int main()
{
        char string[] = "Hello";
        printf("%lu %lu",sizeof(string),strlen(string));
        return 0;
}
```

What is the output of this program?

Ans:

36. Consider the following program:

```
#include<stdio.h>
int main()
{
        float a = 0.5;
        if(a == 0.5)
                printf("Yes");
        else
                printf("No");
        return 0;
}
```

What is the output of this program?

Ans:

37. Consider the following program:

```
#include<stdio.h>
#include<string.h>
void foo(char *);

int main()
{
        char a[100] = {0};
        printf("%lu %lu",sizeof(a),strlen(a));
        return 0;
}
```

What is the output of this program?

Ans:

38. Consider the following program:

```
#include<stdio.h>
int main()
{
        int a;
        printf("%d",scanf("%d",&a));
        return 0;
}
```

What is the output of the above code?

Ans: 

39. If the binary equivalent of 5.375 in normalised form is 0100 0000 1010 1100 0000 0000 0000 0000, what will be the output of the program ?

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

int main()
{
        float a=5.375;
        char *p;
        int i;
        p = (char*)&a;
        for(i=0; i<2; i++)
                printf("%02x ", (unsigned char)(p[i]^p[3-i]));
        return 0;
}
```

Ans:

40. Consider the following program:

```
#include<stdio.h>
int main()
{
        char str[] = {'a','b','c','\0'};
        str[0] -= 32;
        printf("%s",str);
        return 0;
}
```

What is the output of the above code?

Ans: 

41. What is the following function doing?

```
int foo(int n)
{
        int sum = 0;
        while(n > 0)
        {
                n = n & n-1;
                sum++;
        }
        return sum;
}
```

Ans:

42. What is the following function doing?

```
int foo(int a, int b)
{
        int c = a, d = b;
        while(a != b)
        {
                if(a < b)
                        a = a+c;
                else
                        b = b+d;
        }
        return a;
}
```

Ans: 

43. What is the following function doing?

```
int foo( int a, int b)
{
        int c = a-b;
        c = c&(0x80000000);
        return (!c)*a +(!!c)*b;
}
```

Ans:

44. What is the following function doing?

```
unsigned fun(unsigned a, unsigned b)
{
        int i;
        unsigned  j = 0;
        for(i = 0; i < 32; i++)
        {
                j <<= 1;
                j += !!(a & 0x80000000);
                a <<= 1;
                if(j >=b)
                {
                        j -= b;
                        a++;
                }

        }
        return a;
}
```

Ans:

45. What is the following function doing?

```
unsigned fun(unsigned int a)
{
        unsigned int i, x = 0, y = 0, z = 0;
        for(i = 0; i < 16; i++)
        {
                y <<= 2;
                y += !!(a & 0x80000000) << 1;
                y += !!(a & 0x40000000);
                a <<= 2;
                x = x + (x&1);
                x <<= 1;
                z <<= 1;
                if(x + 1 <= y)
                {
                        x++;
                        z++;
                        y-=x;
                }
        }
        return z;
}
```

Ans:

46. Write the code to dynamically allocate a 2-D array of size m x n.

Ans:

47. Declare a pointer to a function accepting an integer and returning void.

Ans:

48. Write the *condition* so that the below code outputs “Hello World”.

```
#include<stdio.h>
int main()
{
        if(<condition>)
        {
                printf("Hello ");
        }
        else
        {
                printf("World\n");
        }
        return 0;
}
```

Ans:

49. Write a one line code to check if a number is a power of 2.

Ans:

50. Write a one line code to invert the last four bits of an integer.

Ans:

LAB QUES:
Structured Programming
5 mcq -> return type code mark-5
output finding-> 3que mark-10
write a program on a given topic(sum of square of odd numbers from 1 to 99) -> mark-5
what is typecast & dynamic programming? ... -marks-10
Find the suitable data structure, container, algorithm of a given scenario and explanation? marks-10