



PART – B

26.

```
main() {
    for( int i=0; i < 10; i += 3 )
        fork();
}
```

 Number of child processes generated by above code are
 A) 4 B) 15 C) 7 D) 14
27. Consider the Emp relation for storing information of an organization's employees
 Emp(id, name, gender, age, dob, salary, dept)
 Consider the following SQL query :
 select dept from Emp E1 group by dept having avg(salary) > (select avg(salary) from
 Emp E2 where gender = 'Female' and E2.dept = E1.dept)
 Outcome is list of departments for which the average salary of employees is more than
 A) the average salary of all employees in the organization
 B) the average salary of all employees in the same department
 C) the average salary of female employees in the organization
 D) the average salary of female employees of the same department
28. Consider an expression :
 $A \otimes A \otimes A \dots A \otimes A$
 Here \otimes represents XOR operation. This boolean expression evaluates to A only if
 A) Number of XOR operations are even
 B) Number of XOR operations are odd
 C) A is always TRUE
 D) A is always FALSE
29. The file organization that provides very fast access is
 A) Ordered file B) Unordered file C) Hashed file D) B-tree
30. Minimum amount of ROM needed to implement a 4 bit multiplier is
 A) 64 Bytes B) 256 Bytes C) 1 Kilobytes D) 2 Kilobytes
31. Of nine points in a 2D plane, five points are collinear (lying on same line). How many
 triangles can be constructed from these points ?
 A) 24 B) 40 C) 44 D) 64
32. Microcode or microprogram is stored in
 A) Cache memory B) BIOS C) ALU D) Control Unit



33. Consider the following pseudo code. What is the total number of multiplications to be performed ?
- ```
D = 2 for i = 1 to n do for j = i to n do for k = j + 1 to n do D = D * 3
```
- A) Half of the product of the 3 consecutive integers.  
 B) One-third of the product of the 3 consecutive integers.  
 C) One-sixth of the product of the 3 consecutive integers.  
 D) One-fourth of the product of the 3 consecutive integers.
34. Let  $A[1 .. n]$  be an array of  $n$  distinct numbers. If  $i < j$  and  $A[i] > A[j]$ , the pair  $(i, j)$  is called an inversion. If  $A$  is sorted in descending order, number of inversions are
- A)  $n(n - 1) / 2$       B)  $n \log(n)$       C)  $n(n + 1) / 2$       D)  $n.n - 1$
35. A processor requires 500 ns to execute an instruction provided there is no cache miss for a memory reference. On an average, an instruction requires two memory accesses. Every cache miss requires additional time of 2000 ns, half of which is used for bus access. It is given that 1% of memory references result in cache miss. Determine the percentage usage of a bus by a processor
- A)  $1/52$       B)  $1/27$       C)  $1/13$       D)  $4/27$
36. A DFA recognizes a string of form  $0^m.k1^{2n+1}$ ,  $m$  and  $n$  are positive integers. All strings consisting of a sequence of zeros (number of zeros is a multiple of  $k$ ) followed by a string of odd number of 1s. So strings 000111, 00000011111, ... are in language  $L$  of this DFA. Minimum number of states needed to implement this DFA is
- A)  $k + 2$       B)  $2k$       C)  $k + 1$       D)  $2k + 1$
37. Consider a page reference string,  $p_1, p_2, ..p_N, p_1, p_2, .. p_N, p_1, p_2, .. p_N$ . These pages are referenced in a paged memory having  $M$  pages. Initially, none of the pages are loaded in memory. For  $N = 2M$ , number of page faults produced by FIFO and LRU are
- A)  $2M, 2M$       B)  $3M, 2M$       C)  $2M, 3M$       D)  $3M, 3M$
38. Consider the following grammar :
- $S := PQ$   
 $P := QaQ \mid a$   
 $Q := bbP$
- Which of the following is FALSE in respect of strings produced by the grammar ?
- A) all strings are of even length  
 B) no string has odd number of consecutive  $b$   
 C) no string has four consecutive  $b$   
 D) no string has three consecutive  $a$



39. Consider the following C code fragment :

```
int A = 3, B = 7, C = 9, X, Y;
X = A, B, C;
Y = (A, B, C)
```

Which of the following is correct ?

- A) X = 9 and Y = 9
- B) X = 3 and Y = 9
- C) X = 9 and Y = 3
- D) X = 3 and Y = 3

40. Consider the following C function in which size is the number of elements in the array

```
int MyX(int *E, unsigned int size) { int Y = 0, Z; int i, j, k; for(i = 0; i < size; i++)
Y = Y + E[i]; for(i = 0; i < size; i++) for(j = i; j < size; j++) { Z = 0;
for(k = i; k <= j; k++) Z = Z + E[k];
if (Z > Y)
Y = Z;
} return Y;
}
```

The value returned by the function MyX is the

- A) maximum possible sum of elements in any sub-array of array E
- B) maximum element in any sub-array of array E
- C) sum of the maximum elements in all possible sub-arrays of array E
- D) the sum of all the elements in the array E

41. Given quantum of 10 for round robin scheduling

| # (job no) | T (process time) | ArrivalTime |
|------------|------------------|-------------|
| 0          | 40               | 0           |
| 1          | 20               | 10          |
| 2          | 10               | 10          |
| 3          | 20               | 20          |
| 4          | 50               | 20          |

What will be the turnaround time for process p2 and p3 respectively ?

- A) 90, 110
- B) 30, 90
- C) 70, 90
- D) 110, 90



42. What is true about run time complexity of these 2 code snippets ?

```
fun1(int n) fun2(int n)
{ {
int i=1, s=1; int i=1, s=1;
 While (s <= n) for (i =1; i*i <=n; i++)
 { {
 i++; cont++;
 s=s+i; }
printf(“*”); }
 } }
}
```

- A) fun1() runs in  $O(n)$  while fun2() runs in  $O(n^2)$   
B) Both fun1() and fun2() run in linear time  
C) Both fun1() and fun2() run in  $O(\sqrt{n})$   
D) None of these
43. Which of the following TCP variant uses congestion avoidance algorithm?  
A) TCP Tahoe      B) TCP Reno      C) TCP Vegas      D) All of the above
44. In Time Division Multiple Access (TDMA), which of the following statements are true ?  
i) All stations transmit data on same frequency  
ii) Their transmission time are separated in time  
iii) A single frequency cannot be shared among many users  
iv) Time synchronization is not required  
A) Only ii  
B) Only i and ii  
C) Only ii and iii  
D) Only i, ii and iv
45. A grammar for a programming language is a formal description of  
A) Syntax      B) Semantics      C) Code      D) None
46. Type checking is normally done during  
A) Lexical analysis  
B) Syntax analysis  
C) Syntax directed translation  
D) Code optimization



47. Recursive descent parsing is an example of
- A) Top down parsing
  - B) Bottom up parsing
  - C) Both of the above
  - D) None of the above
48. In a syntax directed translation scheme, if the value of an attribute of a node is a function of the values of the attributes of its children, then it is called a
- A) canonical attribute
  - B) inherited attribute
  - C) synthesized attribute
  - D) none of the above
49. The 'k', in LR(k) parser cannot be
- A) 0
  - B) 1
  - C) 2
  - D) None of the above
50. The parser tools YACC (or Bison) builds up
- A) SLR parsing table
  - B) LALR parsing table
  - C) Canonical LR parsing table
  - D) All of the above
51. Which of the following database operations do not require the participating tables to be union-compatible ?
- A) Union
  - B) Intersection
  - C) Difference
  - D) Join
52. Which of the following scheme is used to ensure atomicity of transactions in database systems ?
- A) Log File
  - B) Two-phase Locking
  - C) Time-stamp based Protocol
  - D) None of the above
53. For the weighted shortest path problem, let  $d_v$  be the cost of reaching the current vertex  $v$ , let  $w$  be adjacent to  $v$  and assume the edge cost is  $c_{v,w}$ . Suppose that  $d_w$  was the cost of reaching  $w$  prior to examining  $v$ . (Ties are broken in favour of the first path seen). Then under what circumstances is  $w$ 's distance lowered ?
- A)  $d_w > d_v$
  - B)  $d_w > d_v + 1$
  - C)  $d_w > d_v + c_{v,w}$
  - D)  $d_v > d_w + c_{v,w}$



54. Consider the following grammar over the alphabet {b,g,h,i} :

$A \rightarrow BCD$

$B \rightarrow bB \mid \epsilon$

$C \rightarrow Cg \mid g \mid Ch \mid i$

$D \rightarrow AB \mid \epsilon$

Find FOLLOWC)

- A) { $\$, g, b, i$ }      B) { $\$, g, b$ }      C) { $\$, g, b, i, h$ }      D) None

55. Consider the following C code fragment :

```
int a[10][10];
```

```
int i = 0;
```

```
while(i<10)
```

```
{
```

```
 a[i][j]=1;
```

```
 i++;
```

```
}
```

Then the number of leaders in the three address code for above code is

- A) 2      B) 3      C) 4      D) 5

56. For following two sets

(a) Compiler

(1) LRU

(b) Function

(2) Extended machine

(c) Operating system

(3) Language processor

(d) Paging

(4) Call by value

Identify the best match for the above :

A) a-1, b-4, c-3, d-2

B) a-3, b-4, c-2, d-1

C) a-4, b-1, c-2, d-3

D) a-4, b-3, c-2, d-1

57. A computer uses DMA to read from its disk. This disk has 64512 byte sectors per track. The disk rotation time is 16 msec. The bus is 16 bits wide, all bus transfers take 500 ns each. How much is the CPU slow down by DMA ?

A) 20%

B) 25%

C) 34%

D) 50%

58. Consider the following function :

```
int function(int n)
```

```
{
```

```
 if(n-1)
```

```
 return 2*function(n-1)+n;
```

```
 else
```

```
 return 0;
```

```
}
```

What is the value returned by function (5) ?

A) 33

B) 41

C) 57

D) 65



59. What is the time complexity of the following code fragment ?

```
void function (int n)
{
 int i, j, k, count = 0;
 for (i = n / 3; i <= n; i++)
 for (j = 1; j <= n / 2; j = 2 * j)
 for (k = 1; k * k <= n; k++)
 count++;
}
```

- A)  $O((\log_3 n \log_2 n) n^{1/2})$
- B)  $O(n^2 \log n)$
- C)  $O(n^{3/2} \log n)$
- D)  $O(n \log^2 n)$

60. Consider the following code snippet :

```
#include<studio.h>
#define a 10
int main()
{
 printf(“%d,%d,%d”,a++,++a,a++);
 return 0;
}
```

What will be the output ?

- A) 12, 12, 10
- B) 52, 52, 50
- C) 52, 51, 50
- D) Compiler Error

61. In a region of N colleges, 30% of the colleges have three hostels, 50% of the colleges have two hostels, remaining have only one hostel. What is the probability that a randomly picked hostel belongs to a college with three hostels ?

- A) 5/21
- B) 8/21
- C) 1/21
- D) 9/21

62. Assuming a 4 KB page size, what are the page number and offset respectively, for the logical address 4370 (provided as decimal numbers) ?

- A) Page no = 4 and page offset = 272
- B) Page no = 1 and page offset = 274
- C) Page no = 0 and page offset = 370
- D) Page no = 1 and page offset = 272





69. If  $h$  is any hashing function and is used to hash  $n$  keys into a table of size  $m$ , where  $n \leq m$ , the expected number of collisions involving a particular key  $x$  is
- A) less than 1
  - B) less than  $n$
  - C) less than  $m$
  - D) less than  $n/2$
70. An algorithm is made up of two independent time complexities  $f(n)$  and  $g(n)$ . Then the complexities of the algorithm is in the order of
- A)  $f(n) \times g(n)$
  - B)  $\text{Max}(f(n), g(n))$
  - C)  $\text{Min}(f(n), g(n))$
  - D)  $f(n) + g(n)$
71. The goal of hashing is to produce a search that takes
- A)  $O(1)$  time
  - B)  $O(n^2)$  time
  - C)  $O(\log n)$  time
  - D)  $O(n \log n)$  time
72. Assume that the IP address is 108.77.51.70 and subnet mask is 255.255.128.0. What is the subnet number and host number ?
- A) 108.77.0.0, 0.0.51.70
  - B) 0.0.51.70, 108.77.0.0
  - C) 0.77.0.0, 0.0.51.70
  - D) 0.0.51.70, 0.77.0.0
73. A characteristic of the data that binary search uses but the linear search ignores is the
- A) Order of the elements of the list
  - B) Length of the list
  - C) Maximum value in list
  - D) Type of elements of the list
74. A partial order relation is reflexive, anti-symmetric and
- A) Bi-symmetric
  - B) Symmetric
  - C) Transitive
  - D) Asymmetric
75. The cache memory of 1K words uses direct mapping with a block size of 4 words. How many blocks can the cache accommodate ?
- A) 4096 words
  - B) 512 words
  - C) 1024 words
  - D) 256 words



76. A Euler graph is one in which
- A) Only two vertices are of odd degree and rests are even
  - B) Only two vertices are of even degree and rests are odd
  - C) All the vertices are of odd degree
  - D) All the vertices are of even degree
77. Which one is not a way to achieve inter-process communication ?
- A) Signals
  - B) FIFO
  - C) Shared Memory
  - D) Locks
78. Which technique is used to convert a blocking system call into a non-blocking system call (specially when threads are used) ?
- A) Jacketing
  - B) Joining threads
  - C) Detaching threads
  - D) Priority inversion
79. In free space management, Bit-vector method is a trivial method to manage free space. How many disk blocks can be accommodated if we have a bit-vector space of 16 Kbytes (outside the disk) ? The total disk size is 1 GBytes.
- A) 131072
  - B) 128000
  - C) 8192
  - D) 7812.5
80. Usually signals are generated by “Kernel”. Which signal is not sent by the Kernel ?
- A) SIGUSR1
  - B) SIGKILL
  - C) SIGINT
  - D) None of the above
81. A disk has a size of 1 GB and block size of 10 MB. Two file systems can exist together with the help of VFS. How many superblocks will be there on that disk ?
- A) 2
  - B) 1
  - C) 10
  - D) 100
82. Why “Zombie” state is necessary in parent-child relationship ?
- A) It helps in identifying a child which has been exited
  - B) It helps in removing unnecessary buggy processes
  - C) It helps in reaping orphan processes
  - D) All the above



83. The minimum number of D flip-flops needed to design a mod-500 counter is  
A) 250                      B) 10                      C) 9                      D) 8
84. How many number of networks are allowed in Ipv4 Class B addresses ?  
A) 128                      B) 16384  
C) 2097152                      D) None of the above
85. Which of the following transport layer protocols is used to support electronic mail ?  
A) SMTP                      B) IP  
C) TCP                      D) UDP
86. Let G be a simple undirected planar graph on 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to  
A) 3                      B) 4  
C) 5                      D) 6
87. The Protocol Data Unit (PDU) for the application layer in the Internet stack is  
A) Segment                      B) Datagram  
C) Message                      D) Frame
88. An index is clustered, if  
A) it is on a set of fields that form a candidate key  
B) it is on a set of fields that include the primary key  
C) the data records of the file are organized in the same order as the data entries of the index  
D) the data records of the file are organized not in the same order as the data entries of the index
89. What kind of priorities is assigned by hard real time CPU scheduling algorithms to a real time process ?  
A) Static priorities that do not change over time  
B) Dynamic priorities that changes over time  
C) Priorities are assigned randomly  
D) Hard real time CPU scheduling algorithms do not exist
90. What method is used to implement a non-native architecture on a native architecture ?  
A) Para virtualization  
B) Full Virtualization  
C) Hardware Assisted Virtualization  
D) Emulation





96. 'Cycle stealing' is related to  
A) Pipelining  
B) DMA  
C) Microprogramming  
D) ISR
97. CARRY, in half adder, can be obtained by using  
A) AND gate  
B) XOR gate  
C) XNOR gate  
D) OR gate
98. A computer system has 128 MB physical memory and a 32-bit virtual address space. For a page size of 4 KB, what will be the size of the page table ?  
A) 24 MB  
B) 16MB  
C) 8 MB  
D) 2 MB
99. Consider a memory system using variable partition approach for allocation of memory to processes. These are free holes available in order : 10KB, 4KB, 20KB, 18KB, 7KB, 9KB, 12 KB. Which hole is taken for the following requests given in the order : 12KB, 10KB, 9KB using first fit and best fit ?  
A) 20KB, 10KB, 18KB using first fit and 12KB, 10KB, 9KB using best fit  
B) 12KB, 10KB, 9KB using first fit and 20KB, 10KB, 18KB using best fit  
C) 20KB, 10KB, 9KB using first fit and 12KB, 20KB, 18KB using best fit  
D) 20KB, 10KB, 18KB using both first fit and best fit
100. Consider the following table of arrival time and burst time for three processes P0, P1 and P2.

| Process | Arrival time | Burst Time |
|---------|--------------|------------|
| P0      | 0 ms         | 7 ms       |
| P1      | 1 ms         | 3 ms       |
| P2      | 2 ms         | 8 ms       |

Assume that pre-emptive shortest job first scheduling algorithm is used and scheduling is carried out only at arrival or completion of processes. What is the average waiting time for the three processes ?

- A) 2.67 ms  
B) 6.0 ms  
C) 4.33 ms  
D) 3.67 ms
-



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SPACE FOR ROUGH WORK