1. What would be the output of the following C code snippet?

```c
main()
{
    printf("%d,%d
", 5/2, 5/2*3);
}
```

A) 2.5,7.5  
B) 3,9  
C) 2.5,0  
D) 2,6

2. Which of the following statements is TRUE about CSMA/CD protocol?
   A) IEEE 802.11 wireless LAN makes use of CSMA/CD as its data link protocol  
   B) Ethernet is not based on CSMA/CD protocol  
   C) CSMA/CD is not suitable for a high propagation delay network like satellite networks  
   D) CSMA/CD networks are contention-free

3. In a C program, an efficient way to store and manipulate a graph is by using:
   A) A linked list of arrays  
   B) A two dimensional array  
   C) An array of trees  
   D) A stack

4. Suppose A and B are two arrays containing m and n integral values respectively. Assume that each array has separately been sorted in ascending order. What would be the time complexity of merging the contents of A and B into a third array C of m+n elements in the order of ascending values?
   A) O(m+n)  
   B) O(m.n)  
   C) O(m/n)  
   D) O(m-n)

5. Which of the following can be said to be true of a complete binary tree with 2n+1 nodes?
   A) Contains n leaf nodes  
   B) Contains n non-leaf nodes  
   C) Contains n-1 leaf nodes  
   D) Contains n-1 non-leaf nodes

6. Which one of the following data structures would be most appropriate for evaluating a postfix arithmetic expression?
   A) Array  
   B) Linked list  
   C) Stack  
   D) Binary tree
7. The quicksort algorithm is based on which one of the following algorithm design techniques?
   A) Greedy
   B) Dynamic programming
   C) Divide and Conquer
   D) Backtracking

8. Which one of the following SQL statements allows to change the definition of a table?
   A) Alter.
   B) Update.
   C) Create.
   D) Select.

9. Which one of the following keys represents the relationship between two tables?
   A) Primary key
   B) Secondary Key
   C) Foreign Key
   D) Redundant key

10. In a relational database, which one of the following operations should be used if we are interested in only certain columns of a table?
    A) PROJECTION
    B) SELECTION
    C) UNION
    D) JOIN

11. To delete a particular column in a relational table, which one of the following SQL operations should be used?
    A) UPDATE
    B) ALTER
    C) DROP
    D) DELETE

12. Which of the following can be used to make changes to a database permanent?
    A) Rollback
    B) Grant
    C) Commit
    D) Revoke

13. What would be the effect of executing the following C code snippet?
    ```c
    int a=8, b=15;
    x= (a>b) ? a:b;
    ```
    A) assigns 8 to x
    B) gives an error message
    C) assigns 15 to x
    D) assigns 7 to x

14. In a virtual memory operating system, which one of the following events results in a page fault?
A) There is an error in accessing a specific page.
B) A program accesses a page that is not currently residing in main memory.
C) A program accesses a page that is currently residing in main memory.
D) A program accesses a page belonging to another program.

15. How many memory chips of size (128 x 8) are needed to provide a memory capacity of 4096 x 16?
A) 64  
B) 128  
C) 32  
D) 25

16. When a processor fetches an instruction of the executing program, the binary code of the instruction gets stored in which of the following?
A) Program counter.
B) Instruction register.
C) Accumulator.
D) Instruction pointer.

17. For the following C code snippet, how many times will the while loop execute?
```c
char a='a';
while(a > 'a' && a <= 'z') a++;
```
A) 26  
B) 25  
C) 0  
D) Infinite times

18. What is the value of x after completion of execution of the following C program segment?
```c
x=-5; y=10;
if(x>y)x=1;
else if(y<0) x=(x) * (-1);
else x=2*x;
```
A) -10  
B) 5  
C) -5  
D) 10

19. How many times will the for loop of the following C program execute?
```c
main(){
    for( i=10; i<20; i++)
        printf("%d, \n",i);
}
```
A) 10  
B) 11  
C) 9  
D) Infinite number of times

20. In ISO/OSI network architecture, packet routing is the responsibility of which one of the following layers?
A) Network Layer  
B) Transport Layer  
C) Physical Layer  
D) Session Layer

21. Which component of a compiler makes significant use of the concept of a finite state automaton (FSA)?  
A) Lexical analyzer  
B) Parser  
C) Code generator  
D) code optimizer

22. Which one of the following protocols is based on the CSMA/CD protocol?  
A) Ethernet  
B) Token Ring  
C) FDDI  
D) Token bus

23. Which of the following regular expression over {0,1} denotes the set of all strings not containing 100 as a substring  
A) (1+0)*  
B) 0*1010*  
C) (10+1)* 0*  
D) 0*1*01*

24. What is the maximum number of relations that can be defined on the set A = {1, 2, 3, 4}?  
A) 1024  
B) 16  
C) 65536  
D) 256

25. What would be the value of the variable x after the completion of execution of the following C program segment?  
```c
int x=y=5;
x=x+y+1;
```
A) 1  
B) 6  
C) -1  
D) -6

26. Where do Java applets execute?  
A) JVM on server side  
B) JVM on client side  
C) Sometimes on JVM at the client site and sometimes at the server side depending upon the application  
D) JSP on server side

27. Why are start and stop bits used in asynchronous serial communication protocols?  
A) Error detection  
B) Error correction
C) Synchronization  
D) Parity checking

28. Flip flops can be used for realizing which one of the following circuits?  
A) Counter  
B) Modulator  
C) Demodulator  
D) Rectifier

29. An FSM can be designed to recognize the language generated by which one of the following?  
A) Any context free grammar  
B) Any regular grammar  
C) Any Context sensitive grammar  
D) Any unambiguous grammar

30. Which one of the following protocols uses UDP as the transport protocol?  
A) HTTP  
B) Telnet  
C) DNS  
D) SMTP

31. Why are GO TO statements normally avoided while writing a program?  
A) It increases the running time of programs  
B) It increases memory requirements of programs  
C) It results in larger executable code sizes  
D) It makes debugging difficult

32. Consider the statement: ”The different types of employees of an organization are workers, engineers, and managers.” Assuming that Employee, Manager, Worker, and Engineer to be the different classes in a C++ program implementation, what can be said about the relationship between the Employee and Manager classes?  
A) Association  
B) Generalization-specialization  
C) Containment  
D) Polymorphism

33. Which one of the following is a black box testing approach?  
A) Path testing  
B) Boundary value testing  
C) Mutation testing  
D) Branch testing

34. Alpha and Beta testing are considered to be which one of the following types of testing?  
A) Regression testing  
B) Unit testing  
C) Integration testing  
D) System testing

35. In a Java program, which one of the following events will cause a thread to die?  
A) The method wait() is called.  
B) Execution of the run() method ends.
C) Execution of the start() method ends.
D) Execution of the thread’s constructor ends.

36. What will be written to the standard output when the following Java program is run?

```java
public class Puzzle {
    public static void main(String[] args) {
        System.out.println(9 ^ 2);
    }
}
```

A) 81
B) 7
C) 11
D) 0

37. MAC address is used by networking protocols operating at which ISO/OSI layer?
   A) Transport
   B) Data link
   C) Network
   D) Physical

38. What is the purpose of flow control in a communication network?
   A) To ensure that a packet is retransmitted if it is not received at the destination
   B) To reassemble segments at the correct order at the receiving station
   C) To regulate the size of each segment
   D) To provide a means to the receiver to govern the rate at which data is transmitted by the sender

39. How many edges does a complete graph of n vertices have?
   A) n-1
   B) n
   C) n(n-1)/2
   D) n(n+1)/2

40. What is the maximum number of relations that can be formed from set A = {cat, dog, rat} to set B = {male, female}?
   A) 64
   B) 6
   C) 32
   D) 15

41. What can be said about a relation that is reflexive, anti-symmetric and transitive?
   A) Function
   B) Equivalence relation
   C) Partial order
   D) Group

42. What would be the output of the following C code segment?

```c
char x = 'B';
switch (x) {
```
```c
    case 'A': printf("a");
    case 'B': printf("b");
    case 'C': printf("c");
    }
```

43. Which one of the following should be the most appropriate data structure to use for converting a recursion into an iterative procedure?
   A) Queue.
   B) Graph.
   C) Stack.
   D) Tree.

44. What would be the maximum value of a signed integer, if it uses two bytes of storage?
   A) \(2^{16} - 1\)
   B) \(2^{15} - 1\)
   C) \(2^{16}\)
   D) \(2^{15}\)

45. The spanning tree of connected graph with 10 vertices would contain at least
   A) 9 edges
   B) 11 edges
   C) 10 edges
   D) 12 edges

46. Which one of the following sorting algorithms would be the most appropriate to use, if the list to be sorted is almost in the required order?
   A) Quick sort
   B) Merge sort
   C) Insertion sort
   D) Heap sort

47. What would be returned by the following recursive function after we call it with the parameters \((0, 3)\)?
   ```c
   int test (int a, int b){
       if (a==b) return (1);
       else if (a>b) return(0);
       else return (a+test(a+1, b));
   }
   ```
   A) 1
   B) 2
   C) 3
   D) 4

48. To implement a Sparse matrix dynamically, which one of the following data structures would be most appropriate?
   A) Trees
49. What is the maximum number of different Boolean functions involving $n$ Boolean variables?
   A) $n^2$
   B) $2^n$
   C) $2^{2n}$
   D) $2^{n^2}$

50. The Boolean expression $A+BC$ can be expressed as which one of the following?
   A) $(A+B)(A+C)$
   B) $(A'+B)(A'+C)$
   C) $(A+B)(A'+C)$
   D) $(A+B)C$

51. The functional dependencies $A \rightarrow B$ and $DB \rightarrow C$ imply which one of the following dependencies?
   A) $DA \rightarrow C$
   B) $A \rightarrow C$
   C) $B \rightarrow A$
   D) $DB \rightarrow A$

52. In a time-shared operating system, when the allocated time slice of a running process ends, it is put in which one of the following states?
   A) Ready State
   B) Blocked State
   C) Suspend State
   D) Terminated State

53. It is necessary for a relational database table to have at least which one of the following keys?
   A) Secondary key
   B) Alternate key
   C) Unique key
   D) Primary key

54. Which one of the following sorting algorithms is of divide-and-conquer type?
   A) Bubble sort.
   B) Insertion sort.
   C) Quick sort.
   D) Heap sort

55. Which one of the following data structures is used by a compiler to manage information about the program variables and their attributes?
   A) Abstract syntax tree (AST)
   B) Symbol table
   C) Semantic stack
   D) Parser table

56. What is the number of data select inputs that a 64:1 multiplexer would have?
   A) 6
57. What is the language generated by the following grammar over the alphabet \{a,b\}?

\[ S \rightarrow aSa | bSb | a | b \]

A) All palindromes
B) All odd length palindromes
C) All even length palindromes
D) All strings that are not necessarily palindromes

58. Semaphores are normally used to solve which one of the following problems?

A) Race condition
B) Mutual exclusion
C) Deadlock
D) Livelock

59. Which one of the following statements correctly characterizes a critical section?

A) A part of the operating system that cannot be accessed by user processes
B) A segment of instructions of a process that accesses some resource modifiable by other processes
C) A contiguous part of memory to which only one process can write at any time
D) A contiguous part of memory which can be read by one process at a time

60. Which one of the following is the most suitable data structure to use in a program for checking whether an arithmetic expression has balanced parentheses?

A) Queue
B) Tree
C) Heap
D) Stack
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