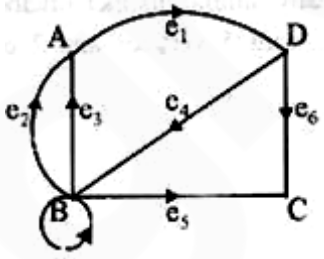
BARC 2019
Comp. Science Engg.

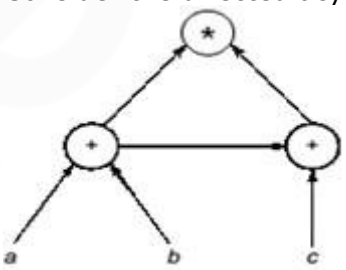
Free Mock Test

gradeup

1. Which type of algorithm is used to solve the "8 Queens" problem?
   A. Greedy
   B. Dynamic
   C. Divide and Conquer
   D. Backtracking
2. Let Y be NP-hard problem and Y polynomially reducible to problem X. If known NP-problem is polynomially reducible to problem Y then X is _____.
   A. P-problem
   B. NP-problem but need not be P-problem
   C. NP-complete problem
   D. NP-hard problem
3. Suppose a file has the following characters and with their frequencies:
   a-3, b-12, C-17 d-25, e-43
   If huffman code is used to encode a file, find the length of encoded file.
   A. 200 B. 203
   C. 204 D. 205
4. Consider the following functions
   $f_1 = n^{25}, f_2 = \sqrt{2n}, f_3 = n+10, f_4 = 10^n$
   Arrange the above functions in ascending order of growth root
   A. $f_1 \le f_2 \le f_3 \le f_4$
   B. $f_2 \le f_3 \le f_4 \le f_1$
   C. $f_2 \le f_3 \le f_1 \le f_4$
   D. $f_1 \le f_2 \le f_4 \le f_3$
5. Consider the following graph G,



   Which of the following statement is correct?
   (i) Graph G is strongly connected
   (ii) Graph G is unilaterally connected
   (iii) Node C is a sink and A is a source node
   A. (i), (ii), (iii) B. (ii), (iii)
   C. (ii) D. (i), (iii)
6. Load the keys 23, 13, 21, 14, 7, 8, and 15 in this order, in a hash table of size 7 using quadratic probing with $c(i) = \pm i^2$ the hash function h(key) = key % 7.
   [Note: The required probe sequences are given by: $h_i(key) = (h(key) \pm i^2)\%7, i = 0,1,2,3...$]
   How many collisions can occur in the hash table?
7. For string operation, DELETE operation is defined as follows.
   DELETE (text, position, length)
   By assuming text = 'GENIUS', position =0 and length = 2, we get output as
   A. GENI
   B. GE
   C. GENIUS
   D. None of the above
8. Consider the directed acyclic graph



   Find the expression that represents above DAG
   A. a+b*c B. a+b+c
   C. a+b*+c D. None of these
9. Consider the following CFG with G as the start symbol
   $G \rightarrow C * S + E \mid CSE$
   $C \rightarrow g \mid CS$
   $S \rightarrow t \mid SE$
   $E \rightarrow r$
   Which of the following non terminals has maximum followers?
   [Maximum followers is defined as maximum number of terminals in the follow set].
   A. G B. C
   C. S D. E

10. Let G be a grammar and G has following set of productions.
S → AA
A → AA | bA | Ab | a
How many strings can be generated by grammar G with atmost four steps in the derivation. [initially start symbol is available without any step]
A. 4 B. 5
C. 3 D. 6

11. Match the following groups.
List-I
A). Allocation
B). Relocation
C). Loading
D). Linking
List-II
I. Resolve the symbol references.
II. Alters the address of instructions and data.
III. Makes the program ready to execute by keeping the machine code in main memory.
IV. Assigns the required memory space for the program.
A. A-3 B-2 C-1 D-4
B. A-3 B-1 C-2 D-4
C. A-4 B-3 C-2 D-1
D. A-4 B-2 C-3 D-1

12. Consider the following SDT.
C → C□S {C. val = C_1. Val+ S.val}
C → S {C. val = S. val}
S → S○ E { S. val = S_1.Val×E.val}
S → E { S. val + E. val}
E → id { E.val = idnum}
Find the value of input expression "2○ 3□5○ 3□1○ 3".
A. 13 B. 24
C. 31 D. 44

13. Match the problem domains in GROUP I with the solution technologies in GROUP II
Group - I
(P) Service oriented computing
(Q) Heterogeneous communicating systems
(R) Information representation
(S) Process Description
Group - II
(1) Interoperability
(2) BPMN
(3) Publish-find-bind
(4) XML
A. P-1, Q-2, R-3, S-4
B. P-3, Q-4, R-2, S-1
C. P-3, Q-1, R-4, S-2
D. P-4, Q-3, R-2, S-1

14. Match the most related terms –

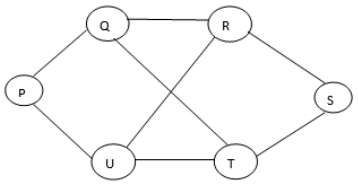
1. HTTPS	I) Breadth of data root
2. DNS	Ii) simplex
3. Traditional mouse	Iii) process
4. Bandwidth	Iv) encryption
5. Port number	V) mapping name to number

A. 1-iv, 2-iii, 3-v, 4-i, 5-ii
B. 1-iv, 2-v, 3-ii, 4-i, 5-iii
C. 1-ii, 2-v, 3-iv, 4-i, 5-iii
D. 1-iv, 2-iii, 3-ii, 4-i, 5-v

15. Which of these are the features of ISDN?
A. ISDN is not concerned with layers 4 to 7 of OSI layer.
B. ISDN is concerned only with the layer 1 to 4 of OSI layer.
C. The numbering plan of ISDN specify the addresses of intermediate exchanges through which the services are to be provided.
D. Both (A) and (C)

16. Given that channel capacity is 250 kbps, find the white noise, present in the channel, if the signal strength is, 15 μW and bandwidth = 8000Hz, SNR = 20000
A. 9.375×10^{-12} watts/Hz
B. 9.370×10^{-11} watts/Hz
C. 9.388×10^{11} watts/Hz
D. 9.368×10^{12} watts/Hz

17. We have used distance vector routing algorithm for the following graph. Routing tables for Q, S, U are shown below. They came to router R. Delays measured from router R to Q, S, U are 6, 4,8.
Q: (3, 0, 3, 5, 10, 5)W
S: (10, 9, 3, 0, 12, 5)
U: (5, 6, 4, 3, 7,0)
Find the distance vector for router R



A. (9, 7, 0, 11, 16, 8)
B. (8, 7, 0, 11, 16, 9)
C. (9, 6, 0, 11, 15, 8)
D. (9, 6, 0,11 ,16 ,9)

18. Which algorithm is mainly used in military applications to send and receive messages.
A. Distance vector routing
B. Link state routing
C. Flooding
D. Multipath Routing

19. A RTT for a transmission is 200 microsec, bandwidth is 20 Mbps, window size is 100bits. Find the throughput in SWP.
A. 2 Mbps B. 20Mbps
C. 0.5 Mbps D. 1Mbps

20. Consider a CIDR IP address 178.168.0.0/14. Find total number of possible hosts.
A. 128 B. 65,536
C. 2,62,144 D. 512

21. The length of 10 Base 5 cable is 2000m. Speed of propagation is $2*10^8$ m/sec. Find the time required by one bit for travelling.
A. 10^{-6} B. 10^{-5}
C. 10^{-8} D. 10^{-7}

22. Register renaming is done in pipelined processor to eliminate _____ hazards.
A. Data dependency
B. Resource conflict
C. Structural dependency
D. Anti dependency

23. When performing booth's Algorithm which types of the shifts are used
A. Logical Right Shift
B. Arithmetic Left Shift
C. Arithmetic Right Shift
D. Logical Left Shift

24. Three computers use register windows with the following characteristics. Determine the total number of registers in computer 3 is.

	COMPUTER 1	COMPUTER 2	COMPUTER 3
Global Registers	10	8	16
Local Registers	10	8	16
Common Registers	6	8	16
Number of Windows	8	4	16

A. 48 B. 528
C. 138 D. 64

25. Consider a 'k' segment pipeline with clock cycle time as 'Tp'. Let there be 'n' tasks to be completed in the pipelined processor. If this pipeline is treated to an ideal pipeline then the cycles per instruction (CPI) value for it is _____.
A. 1 B. 2
C. 3 D. 4

26. CPU performance is dependent upon Instruction Count, CPI (Cycles per instruction) and Clock cycle time. All these three are affected by
A. Program
B. Instruction Set Architecture
C. Compiler
D. Microarchitecture

27. Consider the following C function:

```
int foo(int x, int y){
        if(y==1)
                return x;
        else
                return x + foo(x,y-1);
}
```

What will the function return when x=4 and y = 2?
A. 16 B. 8
C. 6 D. 2

28. Assuming that a pointer take 4 bytes and the size of an integer is 2 bytes. What is the size of the *a in declaration: int (*a) [10][2] ?
A. 4 B. 80
C. 20 D. 40

29. Consider the following C program:

```
int main(){
printf("what %%");
return 0;
}
```

What does the code print?
A. What % B. \"What %% \"
C. What %% D. Compiler Error

30. Consider the following C function:

```
void fun(int a, int b, int c)
{
        a= b == c;
        printf("%d",a);
}
```

If a = 0, b = 3, c = 3 is passed to the function what will be the output?
A. Compiler error B. 3
C. 0 D. 1

31. Consider the following C program:

```
if(a==0)
        a=1;
else
        a=0;
```

The integer a can only take two values 0 and 1, the above statement is similar to?

A. a=1+a B. a=a-1
C. a=1-a D. a++

32. Initially a priority queue had 5 elements and it is being implemented as Max-Heap. Let's say the level order traversal of the heap is: 30, 18, 17, 12, 11. Now two more elements are inserted into the heap i.e. 10 and 19 in the same order. The level order traversal of the heap after the insertion is:

A. 30, 18, 19, 12, 11, 10, 17
B. 30, 19, 18, 12, 11, 17, 10
C. 30, 18, 17, 12, 11, 10, 19
D. 30, 18, 19, 12, 11, 17, 10

33. Consider a program which stores the frequency of marks of student in a particular subject say Mathematics. The marks is in the range [0...100] and there are around 500 students. But there is one condition we only want to record frequency if the student has passed in the exam, the passing marks being 40. What is the best way to store the frequency of marks above 40?

A. An array of 500 numbers
B. An array of 100 numbers
C. An array of 40 numbers
D. An array of 60 numbers

34. Consider a sorted circular doubly-linked list where the head element points to the smallest element in the list, so what is the complexity in terms of Big-Oh for determining the median element in this doubly-linked list?

A. $O(1)$ B. $O(n)$
C. $O(n^2)$ D. None of these

35. A relation R(A,B,C,D,E,F) holds the following FDs.
AB→C
C→D
D→EA
E→F
F→B
Find the number candidate keys of R.

A. 4 B. 5
C. 0 D. none of these

36. Storing the files in certain order is called the file organization. Which among the following is not the objective of the organization.

A. Optimal selection of records.
B. Any insertion or deletion of records should be easy, quick and should not harm nay other records.
C. It allows duplicate records to be included as a result of insert, update or delete.
D. Records should be stored efficiently so that cost of storage is minimal.

37. An index file consists of :

A. A list of keys
B. Pointer to the records
C. Both A and B
D. None of these

38. Consider the following relational database: employee (e-name, street, city)
Works (e-name, c-name, salary)
company (c-name, city)
Manages (e-name, m-name)
Query: Find the name of all the employees who works in First Corporation bank.
Which of the following is true wrt to tuple relational calculus.

A. $\Pi_{\text{e-name}}(\sigma_{\text{c-name = 'First Bank Corporation'}}(\text{works}))$
B. $\{t \mid \exists s \in \text{works}\ (s[\text{e-name}] = t[\text{e-name}] \wedge s[\text{c-name}] = \text{"First Bank Corporation"})\}$
C. {| ∃ c, s (∈ works ∧ c = "First Bank Corporation")}
D. {t | ∃ s ∈ works (s[c-name] = "First Bank Corporation")}

39. The following SQL query is equivalent to which Relational Algebra query

```
SELECT C.CrsName
FROM Course C
WHERE C.DeptId = 'CS'
```

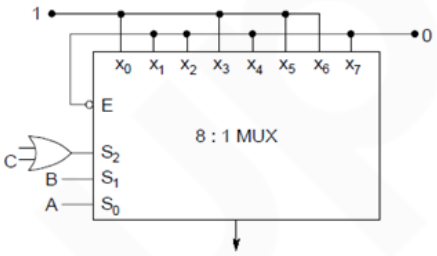
A. $\Pi_{CrsName}\sigma_{DeptId}$='CS' (Course)
B. $\sigma_{CrsName}\Pi_{DeptId}$='CS' (Course)
C. Π_{DeptId}='CS' $\sigma_{CrsName}$ (Course)
D. None of these

40. Consider the following relations student (Sid, Sname) and Apply (Sid, Cname, major). Which of the following SQL query finds the name of students who major in CS.
A. Select Sname
from Student
where SID in(select Sid from Apply where major ='CS')
B. Select distinct Sname
form Student, Apply
where Student Sid=Apply.Sid and major ='CS'
C. Both A and B are correct but processing time in A is more than B.
D. Both A and B are correct but processing time in B is more than A.

41. If B->A, and A->C are functional dependencies for relations A(E, F, G) and B(F, H, I) and relation A has 100 tuples and B has 50 tuples, then find the maximum number of tuples in natural join A B?
A. 50 B. 150
C. 200 D. 250

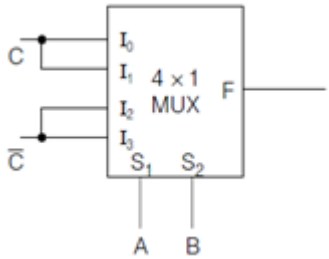
42. Consider the following set of relation schemas
STUDENTS (ROLLNO, NAME, DOB, AGE)
ENROLL (ROLLNO, COURSENO)
COURSES (COURSENO, COURSENAME, INSTRUCTOR)
GRADES (ROLLNO, COURSENO, GRADE)
Consider the following SQL Query-
Select distinct Name, Rollno
From Students, Courses, Grades
Where ((Students.Rollno = Grades.Rollno) and
(Courses.Instructor = 'Mohan') and
(Courses.Courseno = Grades.Courseno) and
Grades.Grade = 'A'))
Which of the following sets is computed by above query?
A. Name and Rollno of the students who have got A grade in all courses.
B. Name and rollno of the students who have got an A grade in all courses taught by Mohan as instructor.
C. Name and rollno of the students who have got an A grade in atleast one course taught by mohan as instructor.
D. None of the above.

43. In the following GATE, circuit S_2, S_1, S_0 is select lines and X_7 to X_0 are input lines. S_0 and X_0 are LSBs. The output Y when S_2 = 1.



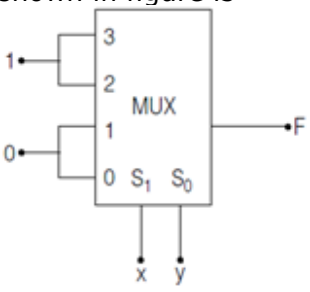
A. indeterminate
B. $A \oplus B$
C. $\overline{A \oplus B}$
D. $\bar{C}\left(\overline{A \oplus B}\right) + C(A \oplus B)$

44. The logic realized by the circuit shown in figure is



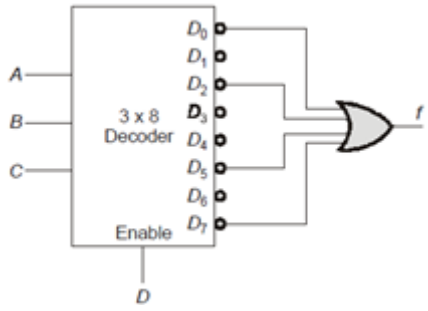
A. $F = A \odot C$ B. $F = A \oplus C$
C. $F = B \odot C$ D. F= B.C

45. The output F of the 4-to-1 MUX shown in figure is



A. $\overline{xy} + x$ B. x
C. $\bar{y}$ D. $xy + \bar{x}$

46. The logic function f (A, B, C, D) implemented by the circuit shown below is



A. $\bar{D}(A \oplus C)$ B. $D(A \odot C)$

C. $\bar{D}(A \oplus C)$ D. D(A.B)

47. What is the number of select lines required in a single input n-output demultiplexer?

A. 2 B. n

C. 2^n D. $\log_2 n$

48. Which among the following proposition is a tautology?

A. (p v q) → q

B. p v (p → q)

C. p v (q → p)

D. None of the above

49. Which of the following statement is not correct?

A. Every valid propositional formula is satisfiable

B. Every satisfiable is tautology

C. Every contradiction is not satisfiable

D. None of the above

50. The following propositional statement is

(P → (QvR)) → ((P^Q) → R)

A. satisfiable but not valid

B. valid

C. a contradiction

D. None of the above

51. Consider the following for CPU scheduling:

Process	Arrival Time	Burst Time
P1	0.0	7
P2	2.0	4
P3	4.0	1
P4	5.0	4

Case 1: Preemptive Shortest Job Fi rst Scheduling

Case 2: Non-preemptive Shortest Job First Scheduling

What is the difference between the average turn-around time found in case-2 and case -1?

A. 1

B. 1.25

C. 1.75

D. 2

52. Solution to Critical Section problem includes mutual exclusion, progress and bounded waiting between two processes. To provide better synchronization between process there is synchronization in hardware, then choose the false among the following in context to hardware.

A. Many systems provide hardware support for critical section code.

B. Modern machines provide special atomic hardware instructions.

C. In a uniprocessor environment by preventing interrupts.

D. Preventing interrupts in Multiprocessor environment.

53. A small disk drive with 80 cylinders (numbered 0 through 79) receives following batch of cylinder requests: 4, 16, 3, 43, 60, 2, 79

The head is initially at cylinder 40 and was headed in the direction of higher cylinder numbers when the batch of requests arrived. Assuming that seek time is proportional to distance, which of these algorithms will result in highest total seek time?

A. FCFS

B. SSTF

C. SCAN

D. LOOK

54. Asymmetric Addressing in IPC means

A. Sender don't name the receiver.

B. Recipient name the sender.

C. Recipient is not required to name the sender.

D. All the above

E. Both A and B

55. Consider the page sequence 4,3,2,1,4,3,5,4,3,2,1,5, if FIFO page replacement algorithm is used and frame size is 3(all initially empty), then the percentage of page fault is:-
A. 75% B. 85%
C. 83% D. 77%

56. Consider the statements with respect to FCFS.
(i) Waiting time can be large if short requests wait behind the long ones.
(ii) It is not suitable for time sharing systems where it is suitable that each process should get the CPU for equal amount of time interval.
(iii) A proper mix of processes is needed to achieve good result from FCFS scheduling.
Which statements are true?
A. i and ii B. ii and iii
C. i and iii D. All are correct

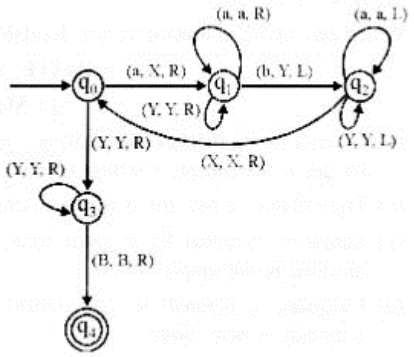
57. Suppose there is a system operating upon round-robin scheduling, If e denotes time that is been needed to do a process switch and if w denotes round-robin time quantum and if n denotes average time that a process is required to run before blocking on I/O. Then tell the Central processing unit (CPU) efficiency under following circumstances. if round-robin time quantum is smaller than the average time i.e(w < n)
A. w
B. $\frac{n}{w+e}$
C. $\frac{w}{w+e}$
D. None of the above

58. The CFG equivalent to the following PDA is
M = {{q_0, q_1}, {0}, {R}, δ, q_0, R, ∅}
Where: $\delta(q_0, 0, R) = \{(q_1, R)\}$
$(q_1, 0, R) = \{(q_1, R)\}$
$(q_1, €, R) = \{(q_1, €)\}$
A. S → $\{q_1, R, q_0\}$
$[q_1, R, q_0] \rightarrow 0[q_1, R, q_1]$
$[q_1, R, q_1] \rightarrow 0[q_1, R, q_1] \mid €$
B. S → $\{q_0, R, q_1\}$
$[q_0, R, q_1] \rightarrow 0[q_1, R, q_1]$
$[q_1, R, q_1] \rightarrow 0[q_1, R, q_1] \mid €$
C. S → $[q_0, R, q_1]\ [q_1, R, q_0]$
$[q_0, R, q_1] \rightarrow 0[q_1, R, q_1]$
$[q_0, R, q_1] \rightarrow 0[q_1, R, q_1]$
$[q_1, R, q_1] \rightarrow € \mid 0$
$[q_1, R, q_0] \rightarrow 0[q_1, R, q_1]$
D. S → $\{q_1, R, q_0\}$
$[q_1, R, q_0] \rightarrow 0[q_1, R, q_1]$
$[q_1, R, q_1] \rightarrow 0[q_1, R, q_1]$

59. A code for the entire TM M consists of all codes for the transitions, in some order, separated by pairs of 1's
$C_1 || C_2 \mid\mid C_3 \mid\mid \ldots\ldots\ldots C_{n-1} \mid\mid C_n$
Where each of C's is the code for one transition M. If there are total 5 transition rules, then how many possible codes are there for machine M?
A. 120 B. 240
C. 60 D. 1

60. Write the transition rule for the code
0001000100010010
A. $\delta(q_3, B) = \delta(q_3, 1, L)$
B. $\delta(q_3, B) = \delta(q_3, 1, R)$
C. $\delta(q_2, 1) = \delta(q_1, 0, L)$
D. $\delta(q_3, 0) = \delta(q_2, 0, R)$

61. The transition diagram for a TM is shown below:



Here: B → Blank
X, Y: tape alphabets
R → Move right
L → Move left
Which of the following strings can be simulated by the above TM
A. aaabb B. aabbaba
C. bbaaaa D. aabb

62. The expression 1 * 2 ^ 3 * 4 ^ 5 * 6 will be evaluated as
A. 3230 B. 16230
C. 49152 D. 173458

63. Which of the following productions eliminate left recursion in the productions given below:
S → Aa | b
A → Ac | Abd | ε
A. S → Aa | b, A→ bdA', A' →A'c | A'ba | A | ε
B. S → Aa | b, A→A', A' → cA' | bdA' | ε
C. S → Aa | b, A →A'c | A'd, A' → bdA' | cA | ε
D. S → Aa | b, A →cA' | adA' | bdA', A' →A | ε

64. The context diagram of a DFD is also known as
A. level 0 DFD
B. level 1 DFD
C. level 2 DFD
D. none of the above

65. Data Flow Diagram (DFD) is also known as a:
A. structure chart
B. bubble chart
C. Gantt chart
D. PERT chart

66. A signal $v(n)$ is defined by

$$v[n] = \begin{cases} 1 & ; \quad n = 1 \\ -1 & ; \quad n = -1 \\ 0 & ; \quad n = 0 \text{ and } |n| > 1 \end{cases}$$

Which is the value of the composite signal defined as v[n] + v[−n]?
A. 0 for all integer values of n
B. 2 for all integer values of n
C. 1 for all integer values of n
D. -1 for all integer values of n

67. The correlation function of a wide sense stationary random process representing a non-deterministic signal is
A. not a deterministic function
B. deterministic, but not symmetric function
C. sometimes non-deterministic function
D. always deterministic and symmetric function

68. An 8 Kbyte ROM with an active low Chip Select input $(\overline{CS})$ is to be used in an 8085-microprocessor based system. The ROM should occupy the address range 1000H to 2FFFH.
The address lines are designated as A15 to A0, where A 15is the most significant address bit. Which one of the following logic expressions will generate the correct $(\overline{CS})$ signal for this ROM?
A. $A_{15} + A_{14} + \left(A_{13} A_{12} + \overline{A_{13}}\,\overline{A_{12}}\right)$
B. $A_{15} A_{14} \left(A_{13} + A_{12}\right)$
C. $\overline{A_{15}} + \overline{A_{14}} + \left(A_{13} A_{12} + \overline{A_{13}}\,\overline{A_{12}}\right)$
D. $\overline{A_{15}} + \overline{A_{14}} + A_{13} A_{12}$

69. Consider an 8085-microprocessor system. The accumulator contains A7H. CY flag = 0. Consider the program snippet below:
RRC
RAL
RAL
RAL
Which of the following is true after the above program is executed?
A. A will contain 9FH, CY=1
B. A will contain 9FH, CY=0
C. A will contain F9H, CY=0
D. A will contain F9H, CY=1

70. Consider an 8085-microprocessor system. The stack pointer register contains 2050H, data byte EEH is stored in memory location 2050H and data byte FFH is stored in location 2051H, register B contains 20H and register C contains 50H.
Consider the program snippet below:
POP H
PUSH B
Which of the following is true after the above program is executed?
A. SP register will contain 2050H
B. SP register will contain 2054H
C. data byte 50H is stored in memory location 2050H and data byte 20H is stored in location 2051H.
D. Both A and C

71. The result evaluating the prefix expression + + ^ 4 2 - 10 4 5 is
A. 60 B. 27
C. 10 D. 20

72. Assume stack A has the entries p, q and r (with p on top and r on bottom). Initially stack B is empty. An entry popped out of stack A can be be printed immediately or pushed to stack B. A entry popped out of stack B can only be printed. What is the least number of stack permutations of input sequence that start with a particular letter?
A. 1 B. 2
C. 3 D. 4

73. A stack can be implemented using two queues. Let the queues be q1, q2 and the stack be s.
The operations push and pop are implemented in the following way:
push (s, x):
a. enqueue x to q1
pop(s):
a. P
b. dequeue last item of q1
c. Q
d. return value in step b
The best possible options for P and Q are respectively
A. dequeue one by one all elements from q1 and enqueue to q2; dequeue one by one all elements from q2 and enqueue to q1
B. dequeue one by one all elements from q1 and enqueue to q2 except the last item; dequeue one by one all elements from q2 and enqueue to q1
C. dequeue one by one all elements from q2 and enqueue to q1; dequeue one by one all elements from q1 and enqueue to q2
D. dequeue one by one all elements from q2 and enqueue to q1 except the last item; dequeue one by one all elements from q1 and enqueue to q2

74. An implementation of a queue Q, using two stacks S1 and S2, is given below:

```
void insert (Q, x) {
push (S1, x);
}
void delete (Q) {
if (stack-empty(S2)) then
if (stack-empty(S1)) then {
print("Q is empty");
return;
}
else while (!(stack-empty(S1))){
x=pop(S1);
push(S2,x);
}
x=pop(S2);
}
```

Let n *insert* and m(≤n) delete operations be performed in an arbitrary order on an empty queue Q. Let x and y be the number of *push* and pop operations performed respectively in the process. Which one of the following is true for all m and n?
A. n +m ≤x <2n & 2m ≤y ≤n +m
B. n +m ≤x <2n and 2m ≤y ≤2n
C. 2m ≤x <2n and 2m ≤y ≤n +m
D. 2m ≤x <2n and 2m ≤y ≤2n

75. Consider the following elements which are inserted into initially empty AVL tree in the given order.
11, 7, 12, 13, 2, 9, 1, 3, 4
What is the last element in preorder traversal of left subtree of resultant AVL tree?
A. 1 B. 11
C. 9 D. 4

76. Assume the preorder traversal of bimary tree is "abc". How many total different binary trees are possible whose postorder traversal is "cba" with the given preorder traversal?
A. 1 B. 2
C. 3 D. 4

77. Consider a hashing function that resolves collision by quadratic probing. Assume the address space is indexed from 1 to 8. If a collision occurs at position 4, then the location which will never be probed is
A. 1 B. 2
C. 3 D. 5

78. Consider a hash table of size 10 that uses open addressing with linear probing.
Let h(k)=(k)mod 10 be hash function used. A sequence of records with keys 43, 36, 92, 87, 11, 44, 71, 13, 14 is inserted into an initially empty hash table, the bins of which are indexed from zero to nine.
What is the index of the bin into which last record is inserted?
A. 5 B. 7
C. 9 D. 12

79. Consider the following pseudo-code for Quicksort:
QUICKSORT(A, p, r)
S ←∅
PUSH(S, (p, r))
while S != ∅
do (p, r) ←POP(S) if p < r
then q ←PARTITION(A, p, r)
PUSH(A, q + 1, r)
PUSH(A, p, q)
What is the max stack depth when A is sorted?
A. 1 B. *n*
C. *n* − 1 D. *log n*

80. Consider the following statements:
i. Selection sort performs minimum number of swaps.
ii. Insertion sort performs worst in case of sorted array.
iii. Floyd Warshall uses dynamic programming to calculate all pairs of shortest paths
Which of the statements are true?
A. i and ii B. ii and iii
C. i and iii D. i, ii and iii

81. The best case of quick sort helps Aditya to sort a particular data set of size 'n' in 640 ms. Suresh also tried the same algorithm on similar data set and it took him 256 ms in best case to sort a file of size 16. What could be Aditya's file size?
A. 30 B. 32
C. 36 D. 38

82. Which one of the following is used to compute the cyclomatic complexity?
A. The number of regions – 1
B. E – N + 1, where E is number of Flow graph edges and N is number of Flow graph nodes.
C. P – 1, where P is the number of predicate nodes in the Flow graph.
D. P + 1, where P is the number of predicate nodes in the Flow graph.

83. Capability Maturity Model (CMM) is a methodology to
A. develop and refine an organization's software development process
B. develop the software
C. test the software
D. all of the above

84. Suppose that a given application is run on a 64-processor machine and that 70 percent of the application can be parallelized. Then the expected performance improvement using Amdahl's law is
A. 4.22 B. 3.22
C. 3.32 D. 3.52

85. Which design matric is used to measure the compactness of the program in terms of lines of code?
A. Consistency B. Conciseness
C. Efficiency D. Accuracy

86. A random bit string of length n is constructed by tossing a fair coin n times and setting a bit to 0 or 1 depending on outcomes head and tail, respectively. The probability that two such randomly generated strings are not identical is
A. $1/2^n$ B. 1 – (1/n)
C. (1/n)! D. $1 – (1/2^n)$

87. Let T = {(1, 3), (2, 4), (3, 5), (2, 7), (4, 6), (5, 6), (3, 7), (5, 8), (6, 10), (7, 9)}.
Where (a, b) represents a = Start time, b = Finish time.
Find the maximum number of tasks that can be scheduled on a single machine?
A. 4 B. 3
C. 2 D. 1

88. Which of the following operators is used to search a specified pattern in a column?
A. GET B. LIKE
C. WHERE D. FROM

89. Which command undo all the updates performed by the SQL in the transaction?
A. Rollback B. Commit
C. Truncate D. Delete

90. **Identify the capabilities of SELECT statement.**
Projection
A) Selection
B) Data Control
C) Transaction
A. A only B. A, B, C only
C. A and C only D. A and B only

91. Consider the following partial Schedule S involving two transactions T1 and T2. Only the read and the write operations have been shown. The read operation on data item P is denoted by read (P) and the write operation on data item P is denoted by write (P).

Time instance	Transaction-id	
	T1	*T2*
1	*read(A)*	
2	*write(A)*	
3		*read(C)*
4		*write(C)*
5		*read(B)*
6		*write(B)*
7		*read(A)*
8		*commit*
9	*read(B)*	

Schedule *S*

Suppose that the transaction *T1* fails immediately after time instance 9. Which one of the following statements is correct?
A. *T2* must be aborted and then both *T1* and *T2* must be re-started to ensure transaction atomicity
B. Schedule *S* is non-recoverable and cannot ensure transaction atomicity
C. Only *T2* must be aborted and then re-started to ensure transaction atomicity
D. Schedule *S* is recoverable and can ensure atomicity and nothing else needs to bed one

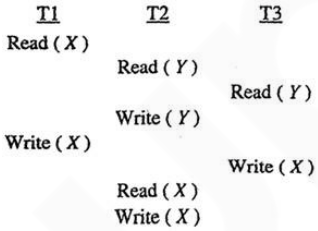
92. Two transactions T_1& T_2 are given as:

$$T_1 : r_1(X) w_1(X) r_1(Y) w_1(Y)$$

$$T_2 : r_2(Y) w_2(Y) r_2(Z) w_2(Z)$$

where $r_i(V)$ denotes a read operation by transaction T_i on a variable V and $w_i(V)$ denotes a write operations by transaction T_i on a variable V. The total number of conflict serializable schedules that can be formed by T_1 and T_2 is _____.
A. 34 B. 44
C. 54 D. 64

93. Which one of the schedules below is the correct serialization of the following schedule of transactions T1, T2 and T3?



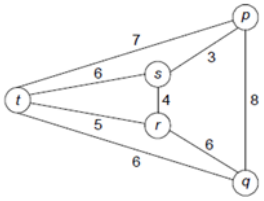
A. T2->>T3->>T1
B. T1->>T3->>T2
C. T2->>T1->>T3
D. T3->>T1->>T2

94. The function, $f(x)=2x^3-3x^2-36x + 10$, has a local maximum value at 'x' equals to.
A. -2 B. -1
C. 3 D. 4

95. Assume g is an element of the group G. Consider the following conditions of g with e as identify element.
(i) $g^8 = e$
(ii) $g^2 \neq e$
(iii) Order of g is not 8
Find the order of g.
A. 2 B. 3
C. 4 D. 5

96 .If Q be the set of non-zero rational number and the relation R be defined over the set Q by xRy if x = 1/y, x, y € Q, which of the following are TRUE?
I. R is an equivalence relation
II. R is reflexive
III. R is symmetric
IV. R is transitive
A. III only
B. III and IV only
C. II and III only
D. I only

97. How many edges are not included in any of the shortest paths from node 's' if dijkastra's algorithm was used to compute shortest paths.



A. 2 B. 3
C. 4 D. 5

98. Consider an open address hash table with uniform hashing. Out of 10 locations, 8 are occupied. What are the expected number of probes in an unsuccessful and successful search respectively?
A. 5, 1.29 B. 5, 0.8
C. 1.29, 5 D. 1.29, 0.8

99. Consider the following statements.
I. Longer pipeline leads to lower CPI.
II. Higher branch prediction will improve multi cycle performance.
III. Pipelines designs improve CPI over multi cycle designs by overlapping the execution of multiple instructions.
IV. Super scaler processor can reduce CPI below 1 by employing multiple pilpeline.
Which of the above statements are correct?
A. II and IV only
B. III and IV only.
C. I, II and III only.
D. I, IV only.

100. Given two binary strings with binary value 10011100 and 1010101 and some operation is performed on them and output according to it is - 71. Code for ADD operation is 1, for SUB 2, for AND 3 and XOR for 4. Give the integer code for correct operation. Assuming unsigned numbers.
A. 1 B. 2
C. 3 D. None of these

ANSWER KEY

1. Ans. D.	26. Ans. B.	51. Ans. A.	76. Ans. D.
2. Ans. C.	27. Ans. B.	52. Ans. D.	77. Ans. B.
3. Ans. C.	28. Ans. D.	53. Ans. A.	78. Ans. C.
4. Ans. C.	29. Ans. A.	54. Ans. C.	79. Ans. A.
5. Ans. C.	30. Ans. D.	55. Ans. A.	80. Ans. C.
6. Ans.	31. Ans. C.	56. Ans. D.	81. Ans. B.
7. Ans. D.	32. Ans. A.	57. Ans. C.	82. Ans. D.
8. Ans. D.	33. Ans. D.	58. Ans. B.	83. Ans. A.
9. Ans. D.	34. Ans. B.	59. Ans. A.	84. Ans. B.
10. Ans. A.	35. Ans. B.	60. Ans. A.	85. Ans. B.
11. Ans. D.	36. Ans. C.	61. Ans. D.	86. Ans. D.
12. Ans. B.	37. Ans. C.	62. Ans. C.	87. Ans. A.
13. Ans. C.	38. Ans. B.	63. Ans. B.	88. Ans. B.
14. Ans. B.	39. Ans. A.	64. Ans. A.	89. Ans. A.
15. Ans. A.	40. Ans. A.	65. Ans. B.	90. Ans. D.
16. Ans. A.	41. Ans. A.	66. Ans. A.	91. Ans. B.
17. Ans. C.	42. Ans. C.	67. Ans. D.	92. Ans. C.
18. Ans. C.	43. Ans. B.	68. Ans. A.	93. Ans. B.
19. Ans. C.	44. Ans. B.	69. Ans. B.	94. Ans. A.
20. Ans. C.	45. Ans. B.	70. Ans. D.	95. Ans. C.
21. Ans. B.	46. Ans. B.	71. Ans. B.	96. Ans. B.
22. Ans. C.	47. Ans. D.	72. Ans. A.	97. Ans. C.
23. Ans. C.	48. Ans. B.	73. Ans. B.	98. Ans. A.
24. Ans. B.	49. Ans. B.	74. Ans. A.	99. Ans. B.
25. Ans. A.	50. Ans. A.	75. Ans. C.	100. Ans. A.

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