1	**Let A(1:8, -5:5, -10:5) be a three dimensional array. How many elements are there in the array A?**			
	a	1200		
	b	1408		
	c	33		
	d	1050		
2	**The number of rotations required to insert a sequence of elements 9,6,5,8,7,10 into an empty AVL tree is?**			
	a	0		
	b	1		
	c	2		
	d	3		
3	**Opportunistic reasoning is addressed by which of the following knowledge representation**			
	a	Script		
	b	Blackboard		
	c	Production Rules		
	d	Fuzzy Logic		
4	**The following steps in a linked list** **p = getnode()** **info (p) = 10** **next (p) = list** **list = p** **result in which type of operation?**			
	a	pop operation in stack		
	b	removal of a node		
	c	inserting a node		
	d	modifying an existing node		
5	**Shift reduce parsing belongs to a class of**			
	a	bottom up parsing		
	b	top down parsing		
	c	recursive parsing		
	d	predictive parsing		
6	**Which of the following productions eliminate left recursion in the productions given below:** **S → Aa | b** **A → Ac | Sd | ε**			
	a	S → Aa | b ,	A → bdA',	A' → A'c | A'ba | A | ε
	b	S → Aa | b ,	A → A' | bdA'	A' → cA' | adA' | 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

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7	Consider the following psuedocode: x : integer := 1 y : integer := 2 procedure add x := x + y procedure second (P: procedure) x : integer := 2 P() procedure first y : integer := 3 second(add) first() write_integer (x) What does it print if the language uses dynamic scoping with deep binding?		
	a	2	
	b	3	
	c	4	
	d	5	
8	Which logic gate is used to detect overflow in 2's complement arithmetic?		
	a	OR gate	
	b	AND gate	
	c	NAND gate	
	d	XOR gate	
9	In an array of 2N elements that is both 2-ordered and 3-ordered, what is the maximum number of positions that an element can be from its position if the array were 1-ordered?		
	a	1	
	b	2	
	c	N/2	
	d	2N-1	
10	If the frame buffer has 8 bits per pixel and 8 bits are allocated for each of the R, G, B components, what would be the size of the lookup table?		
	a	24 bytes	
	b	1024 bytes	
	c	768 bytes	
	d	256 bytes	

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11	When two BCD numbers 0x14 and 0x08 are added what is the binary representation of the resultant number?	
	a	0x22
	b	0x1c
	c	0x16
	d	results in overflow
12	Which of the following sorting algorithms has the minimum running time complexity in the best and average case?	
	a	Insertion sort, Quick sort
	b	Quick sort, Quick sort
	c	Quick sort, Insertion sort
	d	Insertion sort, Insertion sort
13	The number 1102 in base 3 is equivalent to 123 in which base system?	
	a	4
	b	5
	c	6
	d	8
14	A processor is fetching instructions at the rate of 1 MIPS. A DMA module is used to transfer characters to RAM from a device transmitting at 9600 bps. How much time will the processor be slowed down due to DMA activity?	
	a	9.6 ms
	b	4.8 ms
	c	2.4 ms
	d	1.2 ms
15	A pipeline P operating at 400 MHz has a speedup factor of 6 and operating at 70% efficiency. How many stages are there in the pipeline?	
	a	5
	b	6
	c	8
	d	9
16	How much speed do we gain by using the cache, when cache is used 80% of the time? Assume cache is faster than main memory.	
	a	5.27
	b	2.00
	c	4.16
	d	6.09

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17	Two eight bit bytes 1100 0011 and 0100 1100 are added. What are the values of the overflow, carry and zero flags respectively, if the arithmetic unit of the CPU uses 2's complement form?	
	a	0, 1, 1
	b	1, 1, 0
	c	1, 0, 1
	d	0, 1, 0
18	How many check bits are required for 16 bit data word to detect 2 bit errors and single bit correction using hamming code?	
	a	5
	b	6
	c	7
	d	8
19	What is the maximum number of characters (7 bits + parity) that can be transmitted in a second on a 19.2 kbps line. This asynchronous transmission requires 1 start bit and 1 stop bit.	
	a	192
	b	240
	c	1920
	d	1966
20	IEEE 1394 is related to	
	a	RS-232
	b	USB
	c	Firewire
	d	PCI
21	What will be the cipher text produced by the following cipher function for the plain text ISRO with key k =7. [Consider 'A' = 0, 'B' = 1, ...'Z' = 25] $C_k(M) = (kM + 13) \bmod 26$	
	a	RJCH
	b	QIBG
	c	GQPM
	d	XPIN
22	Any set of boolean operators that is sufficient to represent all boolean expressions is said to be complete. Which of the following is not complete?	
	a	{NOT, OR}
	b	{NOR}
	c	{AND, OR}
	d	{AND, NOT}

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23	Which of the following is the highest isolation level in transaction management?	
	a	Serializable
	b	Repeated Read
	c	Committed Read
	d	Uncommitted Read
24	Consider the following relational schema: Suppliers (sid:integer, sname:string, saddress:string) Parts (pid:integer, pname:string, pcolor:string) Catalog (sid:integer, pid:integer, pcost:real) What is the result of the following query? (SELECT Catalog.pid from Suppliers, Catalog WHERE Suppliers.sid = Catalog.pid) MINUS (SELECT Catalog.pid from Suppliers, Catalog WHERE Suppliers.sname <> 'sachin' and Suppliers.sid = Catalog.sid)	
	a	pid of Parts supplied by all except sachin
	b	pid of Parts supplied only by sachin
	c	pid of Parts available in catalog supplied by sachin
	d	pid of Parts available in catalogs supplied by all except scahin
25	Consider the following dependencies and the BOOK table in a relational database design. Determine the normal form of the given relation. ISBN → Title ISBN → Publisher Publisher → Address	
	a	First Normal Form
	b	Second Normal Form
	c	Third Normal Form
	d	BCNF
26	Calculate the order of leaf(p_{leaf}) and non leaf(p) nodes of a B^+ tree based on the information given below Search key field = 12 bytes Record pointer = 10 bytes Block pointer = 8 bytes Block size = 1 KB	
	a	p_{leaf} = 51 & p = 46
	b	p_{leaf} = 47 & p = 52
	c	p_{leaf} = 46 & p = 51
	d	p_{leaf} = 52 & p = 47

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27	The physical location of a record determined by a formula that transforms a file key into a record location is	
	a	Hashed file
	b	B-Treé file
	c	Indexed file
	d	Sequential file
28	The most simplified form of the boolean function $x(A,B,C,D) = \Sigma(7,8,9,10,11,12,13,14,15)$ (expressed in sum of minterms) is?	
	a	A + A'BCD
	b	AB + CD
	c	A + BCD
	d	ABC + D
29	How many programmable fuses are required in a PLA which takes 16 inputs and gives 8 outputs? It has to use 8 OR gates and 32 AND gates.	
	a	1032
	b	776
	c	1284
	d	1536
30	In a three stage counter, using RS flip flops what will be the value of the counter after giving 9 pulses to its input? Assume that the value of counter before giving any pulses is 1.	
	a	1
	b	2
	c	9
	d	10
31	In which of the following shading models of polygons, the interpolation of intensity values is done along the scan line?	
	a	Gourard shading
	b	Phong shading
	c	Constant shading
	d	Flat shading
32	Which of the following number of nodes can form a full binary tree?	
	a	8
	b	15
	c	14
	d	13

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33	What is the matrix transformation which takes the independent vectors $\begin{bmatrix}1\\2\end{bmatrix}$ and $\begin{bmatrix}2\\5\end{bmatrix}$ and transforms them to $\begin{bmatrix}1\\1\end{bmatrix}$ and $\begin{bmatrix}3\\2\end{bmatrix}$ respectively?	
	a	$\begin{bmatrix}1 & -1\\1 & 0\end{bmatrix}$
	b	$\begin{bmatrix}0 & 0\\0.5 & 0.5\end{bmatrix}$
	c	$\begin{bmatrix}-1 & 0\\1 & 1\end{bmatrix}$
	d	$\begin{bmatrix}-1 & 1\\1 & 0\end{bmatrix}$
34	In 8086, the jump condition for the instruction JNBE is?	
	a	CF = 0 or ZF = 0
	b	ZF = 0 and SF = 1
	c	CF = 0 and ZF = 0
	d	CF = 0
35	How many number of times the instruction sequence below will loop before coming out of the loop? MOV AL, 00H A1: INC AL JNZ A1	
	a	1
	b	255
	c	256
	d	Will not come out of the loop
36	In 8085 microprocessor, the ISR for handling trap interrupt is at which location?	
	a	3CH
	b	34H
	c	74H
	d	24H

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37	**The voltage ranges for a logic high and a logic low in RS-232 C standard is**	
	a	Low is 0.0V to 1.8V, High is 2.0V to 5.0V
	b	Low is -15.0V to -3.0V, High is 3.0V to 15.0V
	c	Low is 3.0V to 15.0V, High is -3.0V to -15.0V
	d	Low is 2.0V to 5.0V, High is 0.0V to 1.8V
38	**In the Ethernet, which field is actually added at the physical layer and is not part of the frame**	
	a	preamble
	b	CRC
	c	address
	d	location
39	**Ethernet layer-2 switch is a network element type which gives**	
	a	different collision domain and same broadcast domain
	b	different collision domain and different broadcast domain
	c	same collision domain and same broadcast domain
	d	same collision domain and different broadcast domain
40	**If the frame to be transmitted is 1101011011 and the CRC polynomial to be used for generating checksum is $x^4 + x + 1$, then what is the transmitted frame?**	
	a	11010110111011
	b	11010110111101
	c	11010110111110
	d	11010110111001
41	**What will be the efficiency of a Stop and Wait protocol, if the transmission time for a frame is 20ns and the propagation time is 30ns?**	
	a	20%
	b	25%
	c	40%
	d	66%
42	**IPv6 does not support which of the following addressing modes?**	
	a	unicast addressing
	b	multicast addressing
	c	broadcast addressing
	d	anycast addressing
43	**What is IP class and number of sub-networks if the subnet mask is 255.224.0.0?**	
	a	class A, 3
	b	class A, 8
	c	class B, 3
	d	class B, 32

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44	**Which algorithm is used to shape the bursty traffic into a fixed rate traffic by averaging the data rate?**	
	a	solid bucket algorithm
	b	spanning tree algorithm
	c	hocken helm algorithm
	d	leaky bucket algorithm
45	**A packet filtering firewall can**	
	a	deny certain users from accessing a service
	b	block worms and viruses from entering the network
	c	disallow some files from being accessed through FTP
	d	block some hosts from accessing the network
46	**Which of the following encryption algorithms is based on the Fiestal struture?**	
	a	Advanced Encryption Standard
	b	RSA public key cryptographic algorithm
	c	Data Encryption Standard
	d	RC4
47	**The protocol data unit for the transport layer in the internet stack is**	
	a	segment
	b	message
	c	datagram
	d	frame
48	**The Guass-Seidal iterative method can be used to solve which of the following sets?**	
	a	Linear algebraic equations
	b	Linear and non-linear algebraic equations
	c	Linear differential equations
	d	Linear and non-linear differential equations
49	**What is the least value of the function $f(x) = 2x^2 - 8x - 3$ in the interval [0 , 5] ?**	
	a	-15
	b	7
	c	-11
	d	-3

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50 Consider the following set of processes, with arrival times and the required CPU-burst times given in milliseconds.

Process	Arrival Time	Burst Time
P1	0	4
P2	2	2
P3	3	1

What is the sequence in which the processes are completed? Assume round robin scheduling with a time quantum of 2 milliseconds.

a. P1, P2, P3
b. P2, P1, P3
c. P3, P2, P1
d. P2, P3, P1

51 In case of a DVD, the speed of data transfer is mentioned in multiples of?

a. 150 KB/s
b. 1.38 MB/s
c. 300 KB/s
d. 2.40 MB/s

52 Suppose we have variable logical records of lengths of 5 bytes, 10 bytes, and 25 bytes while the physical block size in disk is 15 bytes. What is the maximum and minimum fragmentation seen in bytes?

a. 25 and 5
b. 15 and 5
c. 15 and 0
d. 10 and 5

53 A CPU scheduling algorithm determines an order for the execution of its scheduled processes. Given 'n' processes to be scheduled on one processor, how many possible different schedules are there?

a. n
b. n^2
c. n!
d. 2^n

54 Which of the following are the likely causes of thrashing?

a. Page size was very small
b. There are too many users connected to the system
c. Least recently used policy is used for page replacement
d. First in First out policy is used for page replacement

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55	Consider a logical address space of 8 pages of 1024 words each, mapped onto a physical memory of 32 frames. How many bits are there in the physical address and logical address respectively?	
	a	5, 3
	b	10, 10
	c	15, 13
	d	15, 15
56	In a 64-bit machine, with 2 GB RAM, and 8 KB page size, how many entries will be there in the page table if it is inverted?	
	a	2^{18}
	b	2^{20}
	c	2^{33}
	d	2^{51}
57	Which of the following is not a necessary condition for deadlock?	
	a	Mutual exclusion
	b	Reentrancy
	c	Hold and wait
	d	No pre-emption
58	Consider the following process and resource requirement of each process.	

Process	Type 1		Type 2	
	Used	Max	Used	Max
P1	1	2	1	3
P2	1	3	1	2
P3	2	4	1	4

	Predict the state of this system, assuming that there are a total of 5 instances of resource type 1 and 4 instances of resource type 2.	
	a	Can go to safe or unsafe state based on sequence
	b	Safe state
	c	Unsafe state
	d	Deadlock state
59	A starvation free job scheduling policy guarantees that no job indefinitely waits for a service. Which of the following job scheduling policies is starvation free?	
	a	Priority queing
	b	Shortest Job First
	c	Youngest Job First
	d	Round robin

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60	The state of a process after it encounters an I/O instruction is	
	a	ready
	b	blocked
	c	idle
	d	running
61	Embedded pointer provides	
	a	a secondary access path
	b	a physical record key
	c	an inverted index
	d	a prime key
62	A particular parallel program computation requires 100 seconds when executed on a single CPU. If 20% of this computation is strictly sequential, then theoretically the best possible elapsed times for this program running on 2 CPUs and 4 CPUs respectively are	
	a	55 and 45 seconds
	b	80 and 20 seconds
	c	75 and 25 seconds
	d	60 and 40 seconds

63	Consider the following C code.
	
	#include <stdio.h>
	#include <math.h>
	void main()
	{
	double pi = 3.1415926535;
	int a = 1;
	int i;
	
	for(i=0; i < 3; i++)
	if(a = cos(pi * i/2))
	printf("%d ",1);
	else printf("%d ", 0);
	}
	
	What would the program print?	

	a	0 0 0
	b	0 1 0
	c	1 0 1
	d	1 1 1

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64 **What is the output of the following Java program?**

```
Class Test
{
    public static void main (String [] args)
    {
        int x = 0;
        int y = 0;

        for (int z = 0; z < 5; z++)
        {
            if((++x > 2) || (++y > 2))
            {
                x++;
            }
        }
        System.out.println( x + " " + y);
    }
}
```

	a	8 2
	b	8 5
	c	8 3
	d	5 3

65 **Consider the list of page references in the time line as below:**
9 6 2 3 4 4 4 4 3 4 4 2 5 8 6 8 5 5 3 2 3 3 9 6 2 7
What is the working set at the penultimate page reference if Δ is 5?

	a	{8,5,3,2,9,6}
	b	{4,3,6,2,5}
	c	{3,9,6,2,7}
	d	{3,9,6,2}

66 **What is the cyclomatic complexity of a module which has seventeen edges and thirteen nodes?**

	a	4
	b	5
	c	6
	d	7

67 **Which of the following types of coupling has the weakest coupling?**

	a	Pathological coupling
	b	Control coupling
	c	Data coupling
	d	Message coupling

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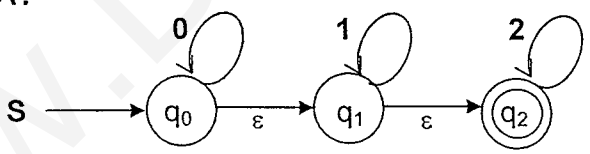
68	**Which of the following testing methods uses fault simulation technique?**	
	a	unit testing
	b	beta testing
	c	stress testing
	d	mutation testing
69	**If a program P calls two subprograms P1 and P2 and P1 can fail 50% of the time and P2 can fail 40% of the time, what is the failure rate of program P**	
	a	50%
	b	60%
	c	70%
	d	10%
70	**Which of the following strategy is employed for overcoming the priority inversion problem?**	
	a	Temporarily raise the priority of lower priority level process
	b	Have a fixed priority level scheme
	c	Implement kernel pre-emption scheme
	d	Allow lower priority process to complete its job
71	**Let P(E) denote the probability of the occurrence of event E. If P(A) = 0.5 and P(B) = 1, then the values of P(A/B) and P(B/A) respectively are**	
	a	0.5, 0.25
	b	0.25, 0.5
	c	0.5, 1
	d	1, 0.5
72	**How many diagonals can be drawn by joining the angular points of an octagon?**	
	a	14
	b	20
	c	21
	d	28
73	**What are the final states of the DFA generated from the following NFA?** 	
	a	q_0, q_1, q_2
	b	$[q_0, q_1], [q_0, q_2], [\,]$
	c	$q_0, [q_1, q_2]$
	d	$[q_0, q_1], q_2$

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74	The number of elements in the power set of the set {{A,B},C} is	
	a	7
	b	8
	c	3
	d	4
75	What is the right way to declare a copy constructor of a class if the name of the class is MyClass?	
	a	MyClass (constant MyClass *arg)
	b	MyClass (constant MyClass &arg)
	c	MyClass (MyClass arg)
	d	MyClass (MyClass *arg)
76	The number of edges in a 'n' vertex complete graph is ?	
	a	n * (n-1) / 2
	b	n^2
	c	n * (n+1) / 2
	d	n * (n+1)
77	The binary equivalent of the decimal number 42.75 is	
	a	101010.110
	b	100110.101
	c	101010.101
	d	100110.110
78	Which of the following is not provided as a service in cloud computing?	
	a	Infrastructure as a service
	b	Architecture as a service
	c	Software as a service
	d	Platform as a service
79	The built-in base class in Java, which is used to handle all exceptions is	
	a	Raise
	b	Exception
	c	Error
	d	Throwable
80	In graphics, the number of vanishing points depends on	
	a	the number of axes cut by the projection plane
	b	the centre of projection
	c	the number of axes which are parallel to the projection plane
	d	the perspective projections of any set of parallel lines that are not parallel to the projection plane

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