

6. (c)

$$\sqrt{\sqrt{12 + \sqrt{12 + \sqrt{12 + \sqrt{12}}}}} = 3.998343153 \approx 4$$

Q.7 inf f (int j)

```
{
    static int i = 50;
    int k;
    if ( i == j)
    {
        printf ("something");
        k = f(i);
        return 0;
    }
    else
        return 0;
}
```

- (a) function will return 0 for all j
- (b) function prints "something" for all values of j
- (c) for i = j function goes into infinite loop
- (d) for i = j function returns 0

7. (c)

f(50) goes into infinite loop by calling f(i) recursively for i = j = 50.

Q.8 Probability that a given integer lying between 1 and 100 (both inclusive) is not divisible by 2, 3 or 5 _____

8. (0.26)

$$1 - \frac{74}{100} = 0.26$$

Q.9 If $|x^2 - 2x + 3| = 11$ then possible values of $|-x^3 + x^2 - x|$

- (a) 4, 5
- (b) 14, 5
- (c) 4, 52
- (d) 14, 52

9. (d)

$$\begin{aligned} x^2 - 2x + 3 &= 11 \\ \Rightarrow x^2 - 2x - 8 &= 0 \\ \Rightarrow x^2 - 4x + 2x - 8 &= 0 \\ \Rightarrow x(x - 4) + 2(x - 4) &= 0 \\ \Rightarrow x = 4, -2 \end{aligned}$$

Put x = 4 in $|-x^3 + x^2 - x|$

$$|-(4)^3 + (4)^2 - (4)| = |-64 + 16 - 4| = |-52| = 52$$

Put $x = -2$ in $|-x^3 + x^2 - x|$

$$|-(-2)^3 + (-2)^2 - (-2)| = 14$$

Q.10 Consider the following code

```
int n = 0
int S = 1
producer ()                consumer ()
{                          {
    produce ();            wait (S);
    wait (S);              wait (n);
    put in buffer ();      consume ();
    signal (S);            signal ();
    signal (n);            }
}                          }
```

- (a) Consumer can consume only one item
- (b) If $n = 1$ initially it is deadlock free
- (c) Have a deadlock when buffer is empty if consumer precedes producer
- (d) They are working properly

10. (c)

Consumer executes wait(S) then wait(n) and goes to sleep by decreasing n value.
After consumer sleep, producer goes to the sleep by executing wait(S).

Q.11 What is tightest upper bound of $2T(n/2) + \log n$

- (a) $O(n)$
- (b) $O(n^2)$
- (c) $O(n \log n)$
- (d) $O(\log n)^2$

11. (a)

$$T(n) = 2 T(n/2) + \log n = O(n)$$

Q.12 Consider the following table

Studid	Studname	Age	Course
1245	Sachin	x	c1
4279	Manjit	18	c4
2481	Sachin	19	c5
9436	Sumit	17	c2

If we are using (Studname, Age) as a key then what should not be the value of x?

12. (19)

Age can not be 19, because (Studname, Age) is a key.

Q.13 Which of the following is true about RIP and OSPF protocol

- (a) RIP uses distance vector routing and OSPF uses link state protocol
- (b) RIP uses link state protocol and OSPF uses distance vector routing
- (c) Both are using vector routing algorithm
- (d) Both are using link state protocol

13. (a)

RIP uses distance vector routing and OSPF uses link state protocol.

Q.14 int f (int num)

```
{  
    int num;  
    int count = 0;  
    while (num)  
    {  
        count ++;  
        num >>= 1;  
    }  
    return (count);  
}
```

What value is returned by f(435) ?

14. (9)

435 = 110110011

num >>= 1; implies a num is shifted one bit right everytime while loop is executed. While loop is executed 9 times successfully and 10th time num is zero. So count is incremented 9 times.

Q.15 It $L_1 = \{a^n \mid n \geq 0\}$ and $L_2 = \{b^n \mid n \geq 0\}$

- I. $L_1 \cdot L_2$ is regular
- II. $L_1 \cdot L_2 = \{a^n b^n \mid n \geq 0\}$.

Which of the following is correct?

- (a) I only
- (b) II only
- (c) both I and II
- (d) none of these

15. (a)

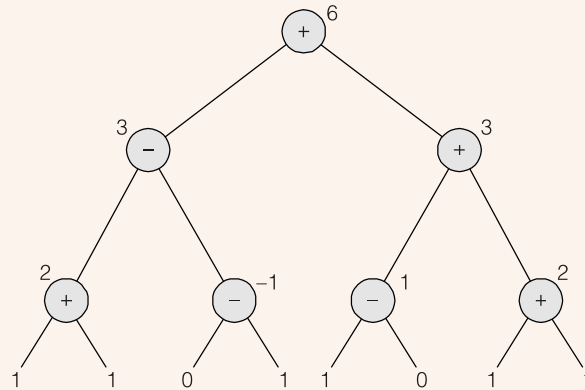
Q.16 Convert decimal -14.25 into IEEE 754 32-bit single precision into hexadecimal where sign bit contain 1 bit, bias field contain 8 bit and mantissa part contain 23 bits.

- (a) 4 1 6 4 0 0 0 0
- (b) 4 1 6 c 0 0 0 0
- (c) c 1 6 4 0 0 0 0
- (d) c 1 6 2 0 0 0 0

16. (c)

$$\begin{aligned} 14.25 &= 1110.010 \\ &= 1.110010 \times 2^3 \\ M &= 110010 \end{aligned}$$

20. (6)



Q.21 Consider the following grammar.

$C \rightarrow S|T$
 $S \rightarrow U + S$
 $S \rightarrow U$
 $U \rightarrow id$
 $T \rightarrow T * R$
 $T \rightarrow R$
 $R \rightarrow id$

Which of the following is true?

- (a) + is left associative, * is right associative
- (b) + is right associative, * is left associative
- (c) + and * both left associative
- (d) + and * both right associative

21. (b)

+ is right associative (with right recursion from S) and
 * is left associative (with left recursion from T)

Q.22 What is the maximum number of edges in bipartite graph with 12 vertices?

22. (36)

Bipartite graph

- (a) 1, 11 $\Rightarrow 1 \times 11 = 11$ edges maximum
- (b) 2, 10 $\Rightarrow 2 \times 10 = 20$ edges maximum
- (c) 3, 9 $\Rightarrow 3 \times 9 = 27$ edges maximum
- (d) 4, 8 $\Rightarrow 4 \times 8 = 32$ edges maximum
- (e) 5, 7 $\Rightarrow 5 \times 7 = 35$ edges maximum
- (f) 6, 6 $\Rightarrow 6 \times 6 = 36$ edges complete bipartite graph = 36 edges

Q.23 Which of the following time with hours and minutes clock produces 60 degree angle between 6 am to 7 am

- (a) 6 : 27 am
- (b) 6 : 22 am
- (c) 6 : 38 am
- (d) 6 : 45 am

23. (b)

Q.24 Determine of $\begin{bmatrix} 2 \\ -4 \\ 7 \end{bmatrix} [1 \ 5 \ 9] = \underline{\hspace{2cm}}$

24. (0)

$$\begin{bmatrix} 2 \\ -4 \\ 7 \end{bmatrix} [1 \ 5 \ 9] = \begin{bmatrix} 2 & 10 & 18 \\ -4 & -20 & 36 \\ 7 & 35 & 63 \end{bmatrix} \rightarrow \det = 0$$

Q.25 Queue is implemented using the stack where stack has 2 operation push and pop. as well as stack has third operation “reverse” to reverse all the elements of the stack. How many stack operations are needed to implement enqueue and dequeue operations of queue respectively?

- (a) 2 operations for enqueue and 1 operation for dequeue
- (b) 3 operations for enqueue and 2 operation for dequeue
- (c) 3 operations for enqueue and 1 operation for dequeue
- (d) 1 operation for enqueue and 3 operations for dequeue.

25. (c)

Three operations for enqueue (reverse, push, reverse).
One operation for dequeue (pop)

Q.26 For n-variables, how many self dual Boolean functions are possible?

- (a) 2^n
- (b) 2^{n-1}
- (c) 2^{2^n}
- (d) $2^{2^{n-1}}$

26. (d)

Q.27 If a cubic polynomial in X has roots at $x = 1$, $x = 2$ and $x = 3$ then which of the following must be true?

- (a) $f(0) \cdot f(4) < 0$
- (b) $f(0) \cdot f(4) > 0$
- (c) $f(0) + f(4) > 0$
- (d) $f(0) + f(4) < 0$

27. (a)

$$f(0) \cdot f(4) < 0$$

Possible combinations:

$$x = 1, y = 30$$

$$x = 2, y = 15$$

$$x = 3, y = 10$$

$$x = 5, y = 6$$

Possible x-y values to satisfy given equation

1. $x = 1, y = 30$

2. $x = 2, y = 15$

3. $x = 3, y = 10$

= 3 possibilities

Q.32 $L = \{ \langle M \mid M \text{ accepts the strings of length } 2014 \rangle \}$. The language L is _____

- (a) Undecidable and Recursive enumerable
- (b) Undecidable but not recursive enumerable
- (c) Decidable and recursive
- (d) Decidable but not recursive

32. (a)

Language is recursive enumerable and it is undecidable.

Q.33 HTML webpage contain an embedded picture within it. How many requests are needed to browse the webpage and embeded pic respectively?

- (a) 2 HTTP requests and 2TCP requests
- (b) 1 HTTP request and 1 TCP request
- (c) 1 HTTP request and 2 TCP requests
- (d) 2 HTTP requests and 1 TCP request

33. (c)

1 HTTP request to load the webpage and 2 TCP requests page and picture.

Q.34 Match List-I and List-II

List-I

- A. Eradicate
- B. Utilize
- C. Saturate
- D. Distort

List-II

- 1. Use
- 2. Misrepresent
- 3. Completely soaked
- 4. Destory

Codes

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 3 | 1 | 2 |
| (b) | 1 | 4 | 2 | 3 |
| (c) | 4 | 1 | 3 | 2 |
| (d) | 1 | 2 | 3 | 4 |

34. (c)

Q.35 If there are 10 computers in a systems out of which 4 are working correctly. 4 computers are selected randomly to test the system functionality. If atleast 3 are found working perfectly then system is declared as working. If the probability that the system is working is 'p', then find 100 p.

35. (17.92)

$$p = {}^4C_3 \cdot (0.4)^3 \cdot (0.6)^1 + ({}^4C_4) \cdot (0.4)^4 \\ = 0.1792$$

$$\Rightarrow 100 p = 17.92$$

Q.36 A system has 8 memory chips. CPU can request a chip through bus in 100 ns and chip needs 500 ns more to service that request. In 1 ms how many requests can be made at maximum?

36. (1666)

Total time of each request = 500ns + 100ns = 600 ns

There are 8 memory chips

1 request → 600 ns

? → 1 ms

$$\frac{1 \text{ ms}}{600 \text{ ns}} = \frac{10^6}{600} = \lfloor 1666.6 \rfloor = 1666 \text{ requests.}$$

Q.37 In an connected unweighted simple graph, breadth first search (BFS) returns _____

- (a) #
- (b) #
- (c) Shorter path from a source to every other vertex
- (d) #

37. (c)

Q.38 Find expected length of following 9 strings if each is written on one card and selected at random.

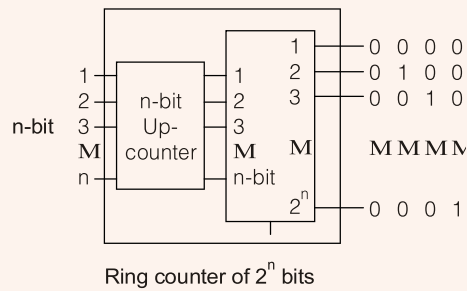
“The quick brown for jumps over the lazy dog”

38. (3.9)

Q.39 If $k = 2^n$ and there is an UP counter of mod k, and which is connected to $n \times 2^n$ decoder then it resembles which of the following?

- (a) Ring counter
- (b) Johnson counter
- (c) Mod k up counter
- (d) Mod k down counter

39. (a)



Q.40 Consider the following function.

```
double f(double x)
{
    if(abs(x * x - 3) < 0.01) return x
    else
        return f(x/2 + 1.5/x);
}
```

Give a value q (to 2 decimal) such that $f(q)$ will return 'q'

40. (1.73)

$$q = 1.73 \Rightarrow f(q) = q$$

Q.41 On increasing the associating of the cache, which of the following is not affected?

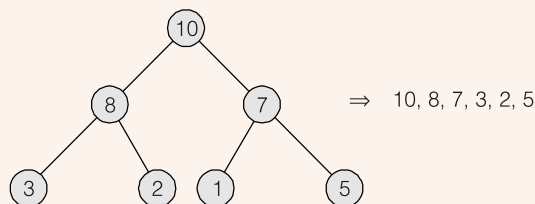
- (a) # (b) #
(c) Data bus from cache to CPU (d) #

41. (c)

Q.42 Given max heap with level order elements as 10, 8, 5, 3, 2 in order. Insert 1 and 7 into the heap tree and find the BFS of resultant tree.

- (a) # (b) #
(c) 10, 8, 7, 3, 2, 1, 5 (d) #

42. (c)

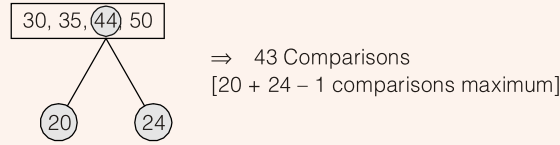


Q.43 Given 5 sorted files with sizes 20, 24, 30, 35 and 50. Find the minimum number of comparisons using optimal merging of these files:

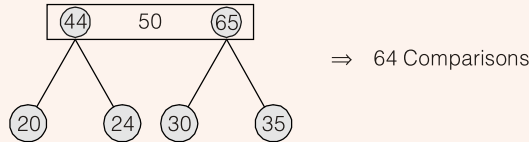
43. (358)

Given files: 20, 24, 30, 35, 50

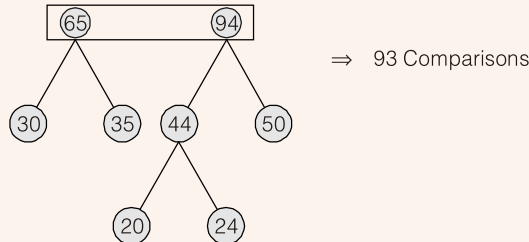
Step-I:



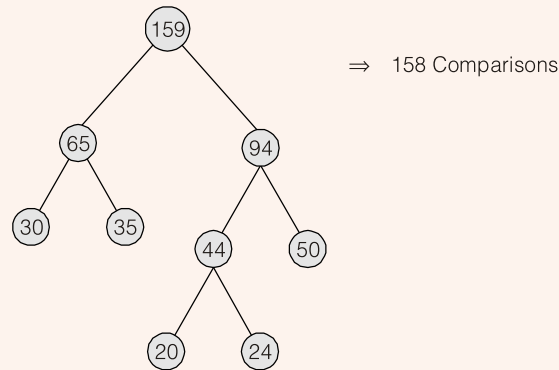
Step-II:



Step-III:



Step-IV:



$$\therefore 158 + 93 + 64 + 43 = 358 \text{ comparisons}$$

Q.44 Assume n is very large and $p = {}^n C_3$. In C , which of the following can compute correctly for p ?

- (a) $P = n \times (n - 1) \times (n - 2)/6$ (b) $P = n \times (n - 1) \times (n - 2)/6.0$
(c) $P = n \times (n - 1)/3 \times (n - 2)/2$ (d) $P = n \times (n - 1)/2 \times (n - 3)/3$

44. (b)

Q.45 India is a colonial country because

- (a) India was former British colony
(b) Indian information technology professionals colonize the world
(c) India does not follow colonial practices
(d) India has helped other countries to gain freedom

45. (a)

Q.46 Which of the following is not a tautology?

- (a) # (b) #
(c) $(a \leftrightarrow c) \rightarrow (\sim b \rightarrow (a \wedge c))$ (d) #

46. (c)

Q.47 Consider the following languages over $\Sigma = \{0, 1\}$.

$L_1 = \{\text{string has at least as many 011 as 110}\}$

$L_2 = \{\text{string has at least as many 000 as 111}\}$

Which of the following is correct?

- (a) L_1 is regular, L_2 is not regular (b) L_1 is non-regular, L_2 is regular
(c) L_1 and L_2 both are regular (d) L_1 and L_2 both are non-regular

47. (a)

Q.48 How many number of distinct integer factors for the number 2014?

48. (8)

1, 2, 19, 38, 53, 106, 1007, 2014

$1 \times 2014 = 2014$

$2 \times 1007 = 2014$

$19 \times 106 = 2014$

$38 \times 53 = 2014$

Q.49 Consider the following matrix of size 5×5 .

1 0 0 0 1

0 1 1 1 0

0 1 1 1 0

0 1 1 1 0

1 0 0 0 1

Find the product of non-zero eigen values.

49. (6)

$$A = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 1 & 0 & 0 & 0 & 1 \end{bmatrix}, \text{ let } X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix}$$

$$Ak = Xk \Rightarrow x_1 + x_5 = kx_1 = kx_5$$

$$\Rightarrow x_2 + x_3 + x_4 = kx_2 = kx_4$$

1. $k \neq 0$

$$\text{say, } x_1 = x_5 = a$$

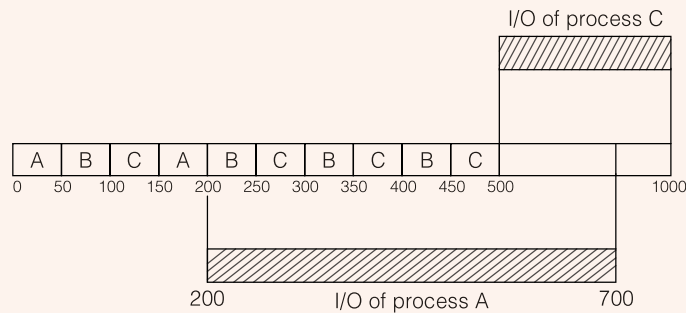
$$x_2 = x_3 = x_4 = b$$

- $\Rightarrow x_1 + x_5 = kx_1 \Rightarrow 2a = ka \Rightarrow k = 2$
 $\Rightarrow x_2 + x_3 + x_4 = kx_2 \Rightarrow 3b = kb \Rightarrow k = 3$
 2. $k = 0 \Rightarrow$ Eigen value $k = 0$
 \therefore There are 3 distinct eigen values = 0, 2, 3
 Product of non-zero eigen values = $2 \times 3 = 6$

Q.50 There are three processes A, B and C are running in round robin. A process can execute again when its CPU and I/O execution completed. Each process is executed three times. All processes are arrived at '0'. I/O requests of multiple processes can be done parallel. Each has the following CPU burst time and I/O time and quantum time is 50 units. Find the time when C completes its I/O?

	CPU Burst Time	I/O
A	100	500
B	300	500
C	200	500

50. (1000)



\therefore At 1000 time units C completes its I/O

Q.51 In a system, 20 frames are available in memory and optimal page replacement policy is being used to replace the page. The pages are numbered from 1 to 100. If these 100 pages are accessed twice in the order from 1 to 100, which of the following gives same number of page faults?

- (a) FIFO (b) LIFO
(c) LRO (d) MRU

51. (d)

Pages: 1, 2, 3, . . . 19, 20, 21, . . . 100, 1, . . . 19, 20, 21, . . . 100

Optimal page replacement:

1	2	3	...	19	20	20 page faults after 1 to 20 pages	
↓							
1	2	3	...	19	100	80 page faults after 21 to 100 pages	
↓							
1	2	3	...	19	100	No page faults from 1 to 19 pages	
↓							
20	21	22	...	19	100	} 80 page faults after 20 to 99 pages and then no page fault for 100	
40	41	42		59			
60	61	62		79			
80	81	82	...	99	100	Total page faults = 180	

Most recently used:

1	2	3	...	19	20	20 page faults after 1 to 20 pages	
↓							
1	2	3	...	19	100	80 page faults after 21 to 100 pages	
↓							
1	2	3	...	19	100	No page faults from 1 to 19 pages	
↓							
20	21	22	...	19	100	} 80 page faults after 20 to 99 pages and then no page fault for 100	
					20		
					⋮		
20	21	22	...	99	100	Total Page faults = 180	

Q.52 Evaluate using Newton-Raphson method $0.75x^3 - 2x^2 + 4x - 4 = 0$. If $x_0 = 2$

Then statement

- I. The value of x_3 is 0
- II. It will converge in finite number of steps.

Then which of the following is true?

- (a) I only
- (b) II only
- (c) I and II both
- (d) Neither I nor II

52. (c)

$$x_0 = 2, x_1 = 0, x_2 = 2, x_3 = 0, \dots$$

$x_3 = 0$, and converges in finite steps

Questions with insufficient information

Q.53 A 4-way set associative with 16 kB cache memory. The block size is 8 word. 1 word means 32 bits and have a main memory of 4 GB. Then calculate the number of tag bit?

53. (?)

Q.54 Find the LCS of given sequences is ? and qpqsrr. Let x is the number of character in LCS and let y be the number of the subsequences. Then find x + 10y.

54. (?)

Q.55 Two relation A and B both are having block size of three assume number of rows $r(A) < r(B)$. If we are using nested block join then what is true about the result that have minimum number of tuples?

- (a) Relation A should have outer query
- (b) Relation B should be outer query
- (c) Both are independent
- (d) None of these

55. (?)

Q.56 What is the maximum size of file you can store on a disk of 100×10^6 bytes with overhead of 4 bytes for every block size of 1000 bytes?

- (a)
- (b)
- (c)
- (d)

56. (?)

Q.57 Consider the following three address code mC for A[i][j][k]

$$\begin{aligned}t_1 &= 1024 \times i \\t_2 &= 32 \times j \\t_3 &= t_1 + t_2 \\t_4 &= 4 \times k \\t_5 &= t_3 + t_4 \\t_6 &= t_5\end{aligned}$$

Consider the size of integer is 32-byte and character is 8 bytes which of the following represents correctly for the above code.

- (a) A[16] [32] [8]
- (b) A[4] [32] [16]
- (c) A[1024] [16] [4]
- (d) A[32] [32] [4]

57. (?)

If there are any queries please contact:
09560815915

