

**GATE-2010**

**Question Paper**

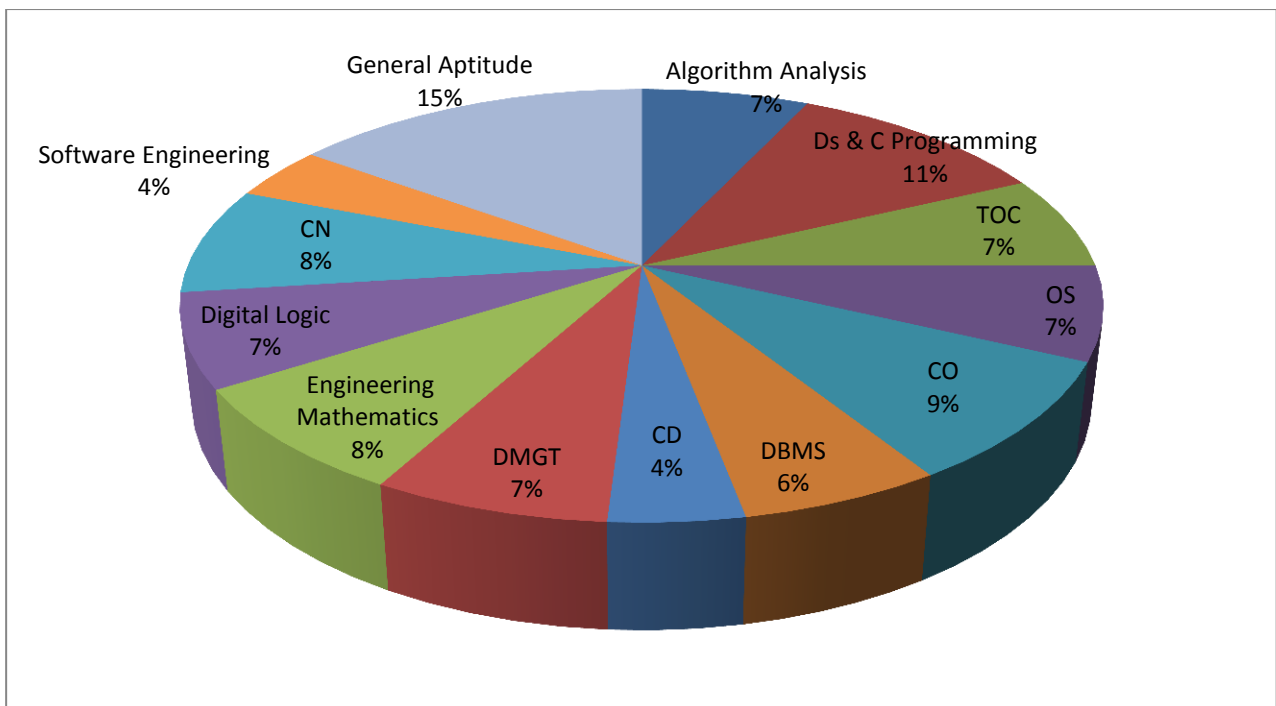
**&**

**Answer Keys**

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# Analysis of Gate 2010 Computer Science



**GATE-2010- CS**

<b>SUBJECT</b>	<b>NO OF QUESTION</b>	<b>Topics Asked in Paper</b>	<b>Total Marks</b>
Algorithm Analysis	1M:1 2M:3	Sorting Algorithms, Graph Algorithms	7
DS & C Programming	1M:3 2M:4	Data Structure and Algorithm Analysis, Stacks and Queues, Trees, Height Balanced Trees (AVL Trees, B and B+), Priority Queues (Heaps),	11
Theory of Computation	1M:1 2M:3	Finite Automata, Regular Expressions and Languages, Properties of Regular Languages, Context Free Grammars and Languages, Pushdown Automata, Properties of CFL Introduction to Turing Machines	7
Operating System	1M:3 2M:2	Introduction to Operating System, Process Management, Threads, CPU Scheduling, Deadlocks, Memory Management & Virtual Memory, File System, Protection and Security	7
Computer Organization	1M:3 2M:3	Introduction to Computer Organization, Pipeline, Instruction Types, Addressing Modes, I/O Data Transfer, Miscellaneous	9
Database and Management System	1M:2 2M:2	ER Diagrams, Functional Dependencies & Normalization, SQL, Relational Algebra & Relational Calculus, Transactions And Concurrency Control, File Structures,	6
Compiler Design	1M:2 2M:1	Introduction to Compiling, Lexical Analysis, Syntax Analysis, Syntax Directed Translation, Run Time Environment, Intermediate Code Generation, Code Optimization,	4
DMGT	1M:3 2M:2	Mathematical Logic, Combinatorics, Sets & Relations, Graph Theory	7
Engineering Mathematics	1M:2 2M:3	Linear Algebra, Probability and Distribution, Numerical Methods, Calculus	8
Digital Logic	1M:3 2M:2	Number systems and code conversions, Boolean algebra & Karnaugh maps, Logic Gates, Logic Gates family, Combinational and Sequential digital Circuits, Semiconductor Memories	7
Computer Network	1M:2 2M:3	Introduction, Medium Access Sublayer, The Data Link Layer, (Flow Control And Error Control), Routing And Congestion Control, TCP/IP, UDP And Sockets, IP(v4), Application Layer, Network Security	8
Software Engineering	1M:2 2M:1	Software and Software Engineering, Requirement Modeling, Process Modeling, Project Management, Testing	4
General Aptitude	1M:5 2M:5	Numerical Ability, Verbal Ability	15
<b>Total</b>	<b>65</b>		<b>100</b>

## GATE 2010 Examination Computer Science

**Q.1 - Q.25 Carry One Mark each.**

1. Let  $G = (V, E)$  be a graph. Define  $\xi(G) = \sum_d i_d \times d$  where  $i_d$  is the number of vertices of degree  $d$  in  $G$ . If  $S$  and  $T$  are two different trees with  $\xi(S) = \xi(T)$ , then
 

(A) $ S  = 2 T $	(C) $ S  =  T $
(B) $ S  =  T  - 1$	(D) $ S  =  T  + 1$

**[Ans. C]**
  
2. Newton-Raphson method is used to compute a root of the equation  $x^2 - 13 = 0$  with 3.5 as the initial value. The approximation after one iteration is
 

(A) 3.575	(C) 3.667
(B) 3.677	(D) 3.607

**[Ans. D]**
  
3. What is the possible number of reflexive relations on a set of  $S$  elements?
 

(A) $2^{10}$	(C) $2^{20}$
(B) $2^{15}$	(D) $2^{25}$

**[Ans. C]**
  
4. Consider the set  $S = \{1, \omega, \omega^2\}$ , where  $\omega$  and  $\omega^2$  are cube roots of unity. If  $*$  denotes the multiplication operation, the structure  $\{S, *\}$  forms
 

(A) a group	(C) an integral domain
(B) a ring	(D) a field

**[Ans. A]**
  
5. What is the value of  $\lim_{n \rightarrow \infty} \left(1 - \frac{1}{n}\right)^{2n}$ ?
 

(A) 0	(C) $e^{-1/2}$
(B) $e^{-2}$	(D) 1

**[Ans. B]**
  
6. The minterm expansion of  $f(P, Q, R) = PQ + Q\bar{R} + P\bar{R}$  is
 

(A) $m_2 + m_4 + m_6 + m_7$	(C) $m_0 + m_1 + m_6 + m_7$
(B) $m_0 + m_1 + m_3 + m_5$	(D) $m_2 + m_3 + m_4 + m_5$

**[Ans. A]**
  
7. A main memory unit with a capacity of 4 megabytes is built using  $1M \times 1$ -bit DRAM chips. Each DRAM chip has 1K rows of cells with 1K cells in each row. The time taken for a single refresh operation is 100 nanoseconds. The time required to perform one refresh operation on all the cells in the memory unit is
 

(A) 100 nanoseconds	(C) $100 \times 2^{20}$ nanoseconds
(B) $100 \times 2^{10}$ nanoseconds	(D) $3200 \times 2^{20}$ nanoseconds

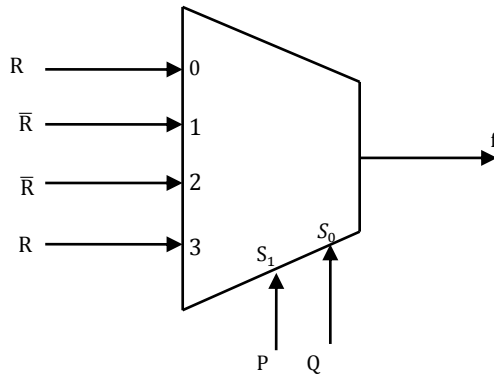
**[Ans. D]**

8. P is a 16-bit signed integer. The 2's complement representation of P is  $(F87B)_{16}$ . The 2's complement representation of  $8 \cdot P$  is

(A)  $(C3D8)_{16}$  (C)  $(F878)_{16}$   
(B)  $(187B)_{16}$  (D)  $(987B)_{16}$

**[Ans. A]**

9. The Boolean expression for the output f of the multiplexer shown below is



(A)  $\overline{P \oplus Q \oplus R}$  (C)  $P + Q + R$   
(B)  $P \oplus Q \oplus R$  (D)  $\overline{P + Q + R}$

**[Ans. B]**

10. In a binary tree with  $n$  nodes, every node has an odd number of descendants. Every node is considered to be its own descendant. What is the number of nodes in the tree that have exactly one child?

(A) 0 (C)  $(n-1)/2$   
(B) 1 (D)  $n-1$

**[Ans. A]**

11. What does the following program print?

```
#include <stdio . h>
void f ( int *p, int *q)
{
    p = q; *p = 2;
}
int i = 0, j = 1 ;
int main ()
{
    f( &i, &j);
    printf ("%d %d\n", i, j) ;
    return 0;
}
```

(A) 2 2 (C) 0 1  
(B) 2 1 (D) 0 2

**[Ans. D]**

12. Two alternative packages A and B are available for processing a database having 10k records. Package A requires  $0.0001 n^2$  time units and packages  $10n \log_{10} n$  time units to process  $n$  records. What is the smallest value of  $k$  for package B will be preferred over A?  
(A) 12 (C) 6  
(B) 10 (D) 5  
**[Ans. C]**
13. Which data structure in a compiler is used for managing information about variables and their attributes?  
(A) Abstract syntax tree (C) Semantic stack  
(B) Symbol table (D) Parse table  
**[Ans. B]**
14. Which languages necessarily need heap allocation in the runtime environment?  
(A) Those that support recursion.  
(B) Those that use dynamic scoping.  
(C) Those that allow dynamic data structures.  
(D) Those that use global variables.  
**[Ans. C]**
15. One of the header fields in an IP datagram is the Time-to-Live (TTL) field. Which of the following statements best explains the need for this field?  
(A) It can be used to prioritize packets.  
(B) It can be used to reduce delays.  
(C) It can be used to optimize throughput.  
(D) It can be used to prevent packet looping.  
**[Ans. D]**
16. Which one of the following is not a client-server application?  
(A) Internet chat (C) E-mail  
(B) Web browsing (D) Ping  
**[Ans. D]**
17. Let  $L_1$  be a recursive language. Let  $L_2$  and  $L_3$  language that are recursively enumerable but not recursive. Which of the following statements is not necessarily true?  
(A)  $L_2 - L_1$  is recursively enumerable (C)  $L_2 \cap L_3$  is recursively enumerable  
(B)  $L_1 - L_3$  is recursively enumerable (D)  $L_2 \cup L_3$  is recursively enumerable  
**[Ans. B]**
18. Consider a  $B^+$ -tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node?  
(A) 1 (C) 3  
(B) 2 (D) 4  
**[Ans. B]**

19. A relational schema for a train reservation database is given below.

Passenger (pid, pname, age)

Reservation (pid, class, tid)

Table: Passenger		
pid	pname	Age
0	'Sachin'	65
1	'Rahul'	66
2	'Sourav'	67
3	'Anil'	69

Table: Reservation		
pid	class	tid
0	'AC'	8200
1	'AC'	8201
2	'SC'	8201
5	'AC'	8203
1	'SC'	8204
3	'AC'	8202

What pids are returned by the following SQL query for the above instance of the tables?

```
SELECT pid
FROM Reservation
WHERE class = 'AC' AND
EXISTS (SELECT *
FROM Passenger
WHERE age > 65 AND
Passenger.pid = Reservation.pid)
```

- (A) 1, 0 (C) 1, 3  
(B) 1, 2 (D) 1, 5

**[Ans. C]**

20. Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?

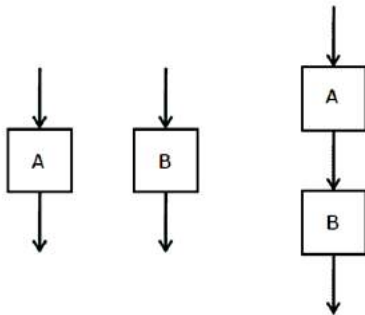
- I. 2-phase locking  
II. Time-stamp ordering

- (A) I only (C) Both I and II  
(B) II only (D) Neither I nor II

**[Ans. B]**

21. The cyclomatic complexity of each of the modules A and B shown below is 10. What is the cyclomatic complexity of the sequential integration shown on the right hand side?





- (A) 19 (C) 20  
(B) 21 (D) 10  
**[Ans. A]**

22. What is the appropriate pairing of items in the two columns listing various activities encountered in a software life cycle?

- P. Requirements Capture 1. Module Development and Integration  
Q. Design 2. Domain Analysis  
R. Implementation 3. Structural and Behavioral Modeling  
S. Maintenance 4. Performance Tuning

- (A) P-3, Q-2, R-4, S-1 (C) P-3, Q-2, R-1, S-4  
(B) P-2, Q-3, R-1, S-4 (D) P-2, Q-3, R-4, S-1

**[Ans. B]**

23. Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned.

Method used by P1	Method used by P2
while (S1 == S2); critical Section S1 = S2;	while (S1 != S2); critical Section S2 = not (S1);

Which one of the following statements describes the properties achieved?

- (A) Mutual exclusion but not progress  
(B) Progress but not mutual exclusion  
(C) Neither mutual exclusion nor progress  
(D) Both mutual exclusion and progress

**[Ans. A]**

24. A system uses FIFO policy for page replacement. It has 4 page frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then accesses the same 100 pages but now in the reverse order. How many page faults will occur?

- (A) 196 (C) 197  
(B) 192 (D) 195

**[Ans. A]**

25. Which of the following statements are true?

- I. Shortest remaining time first scheduling may cause starvation  
II. Preemptive scheduling may cause starvation  
III. Round robin is better than FCFS in terms of response time  
(A) I only (C) II and III only  
(B) I and III only (D) I, II and III

**[Ans. D]**

**Q.26 - Q.55 Carry Two Mark each.**

26. Consider a company that assembles computers. The probability of a faulty assembly of any computer is  $p$ . The company therefore subjects each computer to a testing process. This testing process gives the correct result for any computer with a probability of  $q$ . What is the probability of a computer being declared faulty?

(A)  $pq + (1 - p)(1 - q)$  (C)  $(1 - p)q$   
(B)  $(1 - q)p$  (D)  $pq$

[Ans. A]

27. What is the probability that a divisor of  $10^{99}$  is a multiple of  $10^{96}$ ?

(A)  $1/625$  (C)  $12/625$   
(B)  $4/625$  (D)  $16/625$

[Ans. A]

28. The degree sequence of a simple graph is the sequence of the degrees of the nodes in the graph in decreasing order. Which of the following sequences cannot be the degree sequence of any graph?

I. 7, 6, 5, 4, 4, 3, 2, 1  
II. 6, 6, 6, 6, 3, 3, 2, 2  
III. 7, 6, 6, 4, 4, 3, 2, 2  
IV. 8, 7, 7, 6, 4, 2, 1, 1

(A) I and II (C) IV only  
(B) III and IV (D) II and IV

[Ans. D]

29. Consider the following matrix

$$A = \begin{bmatrix} 2 & 3 \\ x & y \end{bmatrix}$$

If the Eigen values of  $A$  are 4 and 8, then

(A)  $x = 4, y = 10$  (C)  $x = -3, y = 9$   
(B)  $x = 5, y = 8$  (D)  $x = -4, y = 10$

[Ans. D]

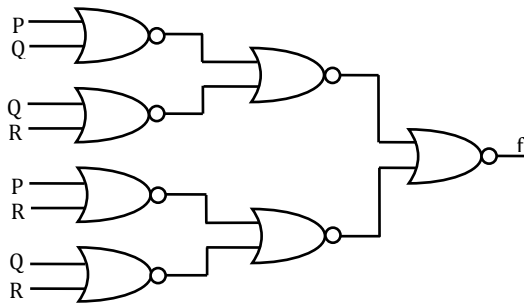
30. Suppose the predicate  $F(x, y, t)$  is used to represent the statement that person  $x$  can fool person  $y$  at time  $t$ . Which one of the statements below expresses best the meaning of the formula

$$\forall x \exists y \exists t (\neg F(x, y, t))?$$

(A) Everyone can fool some person at some time.  
(B) No one can fool everyone all the time.  
(C) Everyone cannot fool some person all the time.  
(D) No one can fool some person at some time.

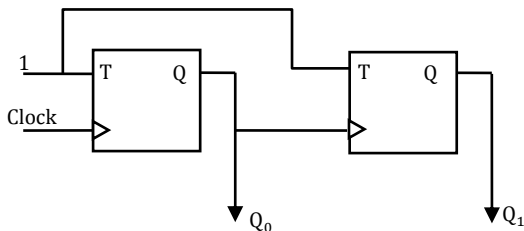
[Ans. B]

31. What is the Boolean expression for the output  $f$  of the combinational logic circuit of NOR gates given below?



- (A)  $\overline{Q + R}$  (C)  $\overline{\overline{P + R}}$   
 (B)  $\overline{P + Q}$  (D)  $\overline{\overline{P + Q + R}}$   
**[Ans. A]**

32. In the sequential circuit shown below, if the initial value of the output  $Q_1Q_0$  is 00, what are the next four values of  $Q_1Q_0$ ?



- (A) 11,10,01,00 (C) 10,00,01,11  
 (B) 10,11,01,00 (D) 11,10,00,01  
**[Ans. A]**

33. A 5-stage pipelined processor has Instruction Fetch (IF), Instruction Decode (ID), Operand Fetch (OF), Perform Operation (PO) and Write Operand (WO) stages. The IF, ID, OF and WO stages take 1 clock cycle each for any instruction. The PO stage takes 1 clock cycle for ADD and SUB instructions, 3 clock cycles for MUL instruction, and 6 clock cycles for DIV instruction respectively. Operand forwarding is used in the pipeline. What is the number of clock cycles needed to execute the following sequence of instructions?

Instruction Meaning of instruction

- $I_0$ : MUL  $R_2, R_0, R_1$       $R_2 \leftarrow R_0 * R_1$   
 $I_1$ : DIV  $R_5, R_3, R_4$       $R_5 \leftarrow R_3 / R_4$   
 $I_2$ : ADD  $R_2, R_5, R_2$       $R_2 \leftarrow R_5 + R_2$   
 $I_3$ : SUB  $R_5, R_2, R_6$       $R_5 \leftarrow R_2 - R_6$

- (A) 13 (C) 17  
 (B) 15 (D) 19

**[Ans. B]**

34. The weight of a sequence  $a_0, a_1, \dots, a_{n-1}$  of real numbers is defined as  $a_0 + \frac{a_1}{2} + \dots + \frac{a_{n-1}}{2^{n-1}}$ . A subsequence of a sequence is obtained by deleting some elements from the sequence, keeping the order of the remaining elements the same. Let X denote the maximum possible weight of a subsequence of  $a_0, a_1, \dots, a_{n-1}$  and Y is the maximum possible weight of a subsequence of  $a_1, a_2, \dots, a_{n-1}$ . Then X is equal to

- (A)  $\max(Y, a_0 + Y)$  (C)  $\max(Y, a_0 + 2Y)$

(B)  $\max(Y, a_0 + Y/2)$

(D)  $a_0 + Y/2$

[Ans. B]

35. What is the value printed by the following C program?

```
#include <stdio . h>
int f(int *a, int n)
{
    if (n <= 0 ) return 0;
    else if (*a % 2 == 0 )
        return *a + f (a + 1, n - 1) ;
    else return *a - f (a + 1, n - 1);
}
int main ( )
{
    int a [ ] = {12, 7, 13, 4, 11, 6} ;
    printf("%d", f(a, 6) ) ;
    return 0;
}
```

(A) -9

(C) 15

(B) 5

(D) 19

[Ans. C]

36. The following C function takes a singly-linked list as input argument. It modifies the list by moving the last element to the front of the list and returns the modified list. Some part of the code is left blank.

```
typedef struct node {
    int value;
    struct node *next;
} Node;
Node *move_to_front (Node *head) {
    Node *p, *q;
    if((head == NULL)|| (head -> next == NULL))
        return head;
    q = NULL;
    p = head;
    while (p->next != NULL) {
        q = p;
        p = p -> next;
    }
    _____
    return head;
}
```

Chose the correct alternative to replace the blank line.

(A)  $q = \text{NULL}; p \rightarrow \text{next} = \text{head};$

$p \rightarrow \text{next} = \text{head};$

$\text{head} = p;$

(C)  $\text{head} = p ; p \rightarrow \text{next} = q;$

(B)  $q \rightarrow \text{next} = \text{NULL}; \text{head} = p;$

$q \rightarrow \text{next} = \text{NULL};$

(D)  $q \rightarrow \text{next} = \text{NULL};$

$p \rightarrow \text{next} = \text{head}; \text{head} = p;$

**[Ans. D]**

37. The program below uses six temporary variables a, b, c, d, e, f.

```
a = 1
b = 10
c = 20
d = a + b
e = c + d
f = c + e
b = c + e
e = b + f
d = 5 + e
return d + f
```

Assuming that all operations take their operands from registers, what is the minimum number of registers needed to execute this program without spilling?

- (A) 2 (C) 4  
(B) 3 (D) 6

**[Ans. B]**

38. The grammar  $S \rightarrow aSa \mid bS \mid c$  is

- (A) LL(1) but not LR(1) (C) Both LL(1) and LR(1)  
(B) LR(1) but not LL(1) (D) Neither LL(1) nor LR(1)

**[Ans. C]**

39. Let  $L = \{w \in (0 + 1)^* \mid w \text{ has even number of 1's}\}$ , i.e. L is the set of all bit strings with even number of 1's.

Which one of the regular expressions below represents L?

- (A)  $(0^*10^*1)^*$  (C)  $0^*(10^*1)^*0^*$   
(B)  $0^*(10^*10^*)^*$  (D)  $0^*1(10^*1)^*10^*$

**[Ans. B]**

40. Consider the language  $L1 = \{0^i1^j \mid i \neq j\}$ ,  
 $L2 = \{0^i1^j \mid i = j\}$ ,  $L3 = \{0^i1^j \mid i = 2j + 1\}$ ,

$L4 = \{0^i1^j \mid i \neq 2j\}$ . Which one of the following statements is true?

- (A) Only L2 is context free (C) Only L1 and L2 are context free  
(B) Only L2 and L3 are context free (D) All are context free

**[Ans. D]**

41. Let w be any string of length n in  $\{0, 1\}^*$ . Let L be the set of all substrings of w.

What is the minimum number of states in a non-deterministic finite automaton that accepts L?

- (A)  $n-1$  (C)  $n+1$   
(B)  $n$  (D)  $2^{n-1}$

**[Ans. C]**

42. Consider the following schedule for transactions T1, T2 and T3

T1	T2	T3
Read(X)		
	Read(Y)	
		Read(Y)
	Write(Y)	
Write(X)		
		Write(X)
	Read(X)	
	Write(X)	

Which one of the schedules below is the correct serialization of the above?

- (A) T1 → T3 → T2
- (B) T2 → T1 → T3
- (C) T2 → T3 → T1
- (D) T3 → T1 → T2

**[Ans. A]**

43. The following functional dependencies hold for relations R(A, B, C) and S(B, D, E):

B → A,  
A → C

The relation R contains 200 tuples and the relation S contains 100 tuples. What is the maximum number of tuples possible in the natural join R⋈S?

- (A) 100
- (B) 200
- (C) 300
- (D) 2000

**[Ans. A]**

44. The following program is to be tested for statement coverage:

```
begin
if(a = b) {S1; exit;}
else if(c = d) {S2; }
else {S3; exit;}
S4;
end.
```

The test cases T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> given below are expressed in terms of the properties satisfied by the values of variables a, b, c and d. The exact values are not given.

T<sub>1</sub>: a, b, c and d are all equal  
T<sub>2</sub>: a, b, c and d are all distinct  
T<sub>3</sub>: a = b and c != d  
T<sub>4</sub>: a != b and c = d

Which of the test given below ensures coverage of statements S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> and S<sub>4</sub>?

- (A) T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>
- (B) T<sub>2</sub>, T<sub>4</sub>
- (C) T<sub>3</sub>, T<sub>4</sub>
- (D) T<sub>1</sub>, T<sub>2</sub>, T<sub>4</sub>

**[Ans. D]**

45. The following program consists of 3 concurrent processes and 3 binary semaphores. The semaphores are initialized as S<sub>0</sub> = 1, S<sub>1</sub> = 0, S<sub>2</sub> = 0

Process P <sub>0</sub>	Process P <sub>1</sub>	Process P <sub>2</sub>
while (true) { wait (S <sub>0</sub> );  print '0'	wait (S <sub>1</sub> ); release (S <sub>0</sub> );	wait (S <sub>2</sub> ); release (S <sub>0</sub> );

```

    release
    (S1);
    release
    (S2);
}

```

How many times will process P0 print '0'?

- (A) At least twice
- (B) Exactly twice
- (C) Exactly thrice
- (D) Exactly once

**[Ans. A]**

46. A system has  $n$  resources  $R_0, R_1, \dots, R_{n-1}$  and  $k$  processes  $P_0, P_1, \dots, P_{k-1}$ . The implementation of the resource request logic of each process  $P_i$ , is as follows:

```

if (i % 2 == 0) {
    if (i < n) request Ri;
    if (i + 2 < n) request Ri+2; }
else {
    if (i < n) request Rn-i;
    if (i + 2 < n) request Rn-i-2;
}

```

In which one of the following situations is a deadlock possible?

- (A)  $n = 40, k = 26$
- (B)  $n = 21, k = 12$
- (C)  $n = 20, k = 10$
- (D)  $n = 41, k = 19$

**[Ans. B]**

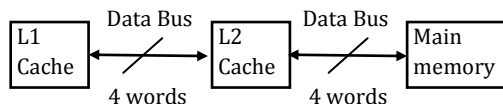
47. Suppose computers A and B have IP addresses 10.105.1.113 and 10.105.1.91 respectively and they both use the same netmask  $N$ . Which of the values of  $N$  given below should not be used if A and B should belong to the same network?

- (A) 255.255.255.0
- (B) 255.255.255.128
- (C) 255.255.255.192
- (D) 255.255.255.224

**[Ans. D]**

**Common Data for Questions 48 and 49**

A computer system has an L1 and an L2 cache, and a main memory unit connected as shown below. The block size in L1 cache is 4 words. The block size in L2 cache is 16 words. The memory access times are 2 nanoseconds, 20 nanoseconds and 200 nanoseconds for L1 cache, L2 cache and main memory unit respectively.



48. When there is a miss in L1 cache and a hit in L2 cache, a block is transferred from L2 cache to L1 cache. What is the time taken for this transfer?

- (A) 2 nanoseconds
- (B) 20 nanoseconds
- (C) 22 nanoseconds
- (D) 88 nanoseconds

**[Ans. C]**

49. When there is miss in both L1 cache and L2 cache, first a block is transferred from main memory to L2 cache, and then a block is transferred from L2 cache L1 cache. What is the total time taken for these transfers?
- (A) 222 nanoseconds (C) 902 nanoseconds  
(B) 888 nanoseconds (D) 968 nanoseconds
- [Ans. C]**

**Common Data for Questions 50 and 51:**

Consider a complete undirected graph with vertex set {0, 1, 2, 3, 4}. Entry  $W_{ij}$  in the matrix  $W$  below is the weight of the edge  $\{i, j\}$ .

$$W = \begin{bmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{bmatrix}$$

50. What is the minimum possible weight of a spanning tree  $T$  in this graph such that vertex 0 is a leaf node in the tree  $T$ ?
- (A) 7 (C) 9  
(B) 8 (D) 10
- [Ans. D]**
51. What is the minimum possible weight of a path  $P$  from vertex 1 to vertex 2 in this graph such that  $P$  contains at most 3 edges?
- (A) 7 (C) 9  
(B) 8 (D) 10
- [Ans. B]**

**Statement for Linked Answer Q.No. 52 & 53**

A hash table of length 10 uses open addressing with hash function  $h(k) = k \text{ mod } 10$ , and linear probing. After inserting 6 values into an empty hash table, the table is as shown below.

0	
1	
2	42
3	23
4	34
5	52
6	46
7	33
8	
9	

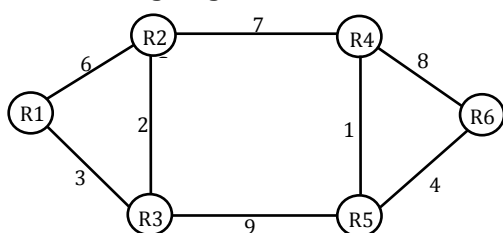
52. Which one of the following choices gives a possible order in which the key values could have been inserted in the table?
- (A) 46, 42, 34, 52, 23, 33 (C) 46, 34, 42, 23, 52, 33  
(B) 34, 42, 23, 52, 33, 46 (D) 42, 46, 33, 23, 34, 52
- [Ans. C]**



53. How many different insertion sequences of the key values using the same hash function and linear probing will result in the hash table shown above?
- (A) 10 (C) 30  
(B) 20 (D) 40
- [Ans. C]**

**Statement for Linked Answer Q.No. 54 & 55**

Consider a network with 6 routers R1 to R6 connected with links having weights as shown in the following diagram.



54. All the routers use the distance vector based routing algorithm to update their routing tables. Each router starts with its routing table initialized to contain an entry for each neighbor with the weight of the respective connecting link. After all the routing tables stabilize, how many links in the network will never be used for carrying any data?
- (A) 4 (C) 2  
(B) 3 (D) 1
- [Ans. C]**
55. Suppose the weights of all unused links in the previous question are changed to 2 and the distance vector algorithm is used again until all routing tables stabilize. How many links will now remain unused?
- (A) 0 (C) 2  
(B) 1 (D) 3

**General Aptitude One Marks Question Q. 56 to Q. 60**

56. Choose the most appropriate word from the options given below to complete the following sentence:  
His rather casual remarks on \_\_\_\_\_ his lack of seriousness about the politics subject.
- (A) masked (C) betrayed  
(B) belied (D) suppressed
- [Ans. C]**
57. Which of the following options is closest in meaning to the word Circuitous?
- (A) cyclic (C) confusing  
(B) Indirect (D) crooked
- [Ans. B]**
58. Choose the most appropriate word from the options given below to complete the following sentence:

If we manage to \_\_\_\_\_ our natural resource, we would leave a better planet for our children.

- (A) uphold (C) cherish  
(B) restrain (D) conserve

**[Ans. D]**

59. 25 persons are in a room. 15 of them play hockey, 17 of them play football and 10 of them play both hockey and football. Then the number of persons playing neither hockey nor football is:

- (A) 2 (C) 13  
(B) 17 (D) 3

**[Ans. D]**

60. The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.

Unemployed: Worker

- (A) fallow: land  
(B) unaware: sleeper  
(C) wit: jester  
(D) renovated: house

**[Ans. A]**

**General Aptitude Two Marks Question Q. 61 to Q. 65**

61. If  $137 + 276 = 435$  how much is  $731 + 672$  ?

- (A) 534 (C) 1623  
(B) 1403 (D) 1513

**[Ans. C]**

62. Hari (H), Gita (G), Irfan (I) and Saira (S) are siblings (i.e. brothers and sisters). All were born on 1st January. The age difference between any two successive siblings (that is born one after another) is less than 3 years. Given the following facts:

- a. Hari's age + Gita's age > Irfan's age + Saira's age.  
b. The age difference between Gita and Saira is 1 year. However Gita is not the oldest and Saira is not the youngest.  
c. There are no twins.

In what order were they born (oldest first)?

- (A) HSIG (C) IGSH  
(B) SGHI (D) IHSG

**[Ans. B]**

63. Modern warfare has changed from large scale clashes of armies to suppression of civilian populations. Chemical agents that do their work silently appear to be suited to such warfare; and regrettably, there exist people in military establishments who think that chemical agents are useful tools for their cause.

Which of the following statements best sums up the meaning of the above passage:

- (A) Modern warfare has resulted in civil strife.  
(B) Chemical agents are useful in modern warfare.  
(C) Use of chemical agents in warfare would be undesirable.  
(D) People in military establishments like to use chemical agents in war.

**[Ans. D]**

64. 5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi- skilled and 5 unskilled workers, how long will it take to build the wall?

(A) 20 days

(C) 16 days

(B) 18 days

(D) 15 days

**[Ans. D]**

65. Given digits 2,2,3,3,3,4,4,4,4 how many distinct 4 digit numbers greater than 3000 can be formed?

(A) 50

(C) 52

(B) 51

(D) 54

**[Ans. B]**