GATE

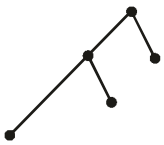
Subject : CS 2010 - SOLUTIONS

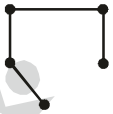
TECHNICAL SECTION (Q. NO. 1 – 25) 1 MARKS

1. ζ (G) calculates the sum of degrees of vertices of G

It is given that ζ (S) = ζ (T)

Consider the trees S and T as follows :

S : 

T : 

Sum of degree of vertices
= 2 + 3 + 1 + 1 + 1
= 8
Also |S| = 5

Sum of degree of vertices
= 2 + 2 + 1 + 2 + 1
= 8
|T| = 5

Hence it can also be proved by using induction that trees having equal sum of degree of vertices have equal number of vertices.

$\therefore$ |S| = |T|

(C) is the answer.

2. For Newton-Raphson's method, we have

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$f(x) = x^2 - 13$

$f'(x) = 2x$

$x_0 = 3.5$ ——— given

$$\therefore x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$= 3.5 - \frac{(3.5)^2 - 13}{2(3.5)}$$

$\therefore x_1 = 3.607$

(D) is the answer

3. On a set of 'n' elements,
Number of reflexive relations = $2^{n(n-1)}$
For n = 5
Reflexive relations = $2^{5 \times 4} = 2^{20}$
(C) is the answer.

4. (S, *)

*	1	w	w^2
1	1	w	w^2
w	w	w^2	1
w^2	w^2	1	w

S is closed
$\therefore$ S is a groupoid
Also,
(1 * w) * w = 1 * (w * w)
i.e. S is assoicative
$\therefore$ S is a semigroup
We know that for multiplication, identity element
e = 1
a * e = e * a = a $\quad \forall \ a \in S$
$w^2 * 1 = 1 * w^2 = w^2$
$\therefore$ S is a monoid
For S to be a group, it should satisfy the property of inverse along with the above properties.
a * b = b * a = e where $\boxed{b = a^{-1}}$ $\forall \ a \in S$
For 1, inverse is 1
as 1 * 1 = e = 1
For w, inverse is w^2
as $w * w^2 = e = 1$
For w^2, inverse is w
as $w^2 * w = e = 1$
$\therefore$ S is a group
(A) is the answer.

5. $\lim_{n\to\infty}\left(1-\frac{1}{n}\right)^{2n}$

$= \lim_{n\to\infty}\left(\left(1-\frac{1}{n}\right)^{-2n}\right)^{-1}$

$= \lim_{n\to\infty}\left(\left(1-\frac{1}{n}\right)^{-n}\right)^{-2}$

$= e^{-2}$ $\quad\because \lim_{x\to\infty}(1+x)^{1/x} = e$

(B) is the answer

6. f (P, Q, R) = $PQ + Q\bar{R} + P\bar{R}$

$= PQ(R+\bar{R}) + Q\bar{R}(P+\bar{P}) + P\bar{R}(Q+\bar{Q})$

$= PQR + PQ\bar{R} + PQ\bar{R} + \bar{P}Q\bar{R} + PQ\bar{R} + P\bar{Q}\bar{R}$

$= PQR + PQ\bar{R} + \bar{P}Q\bar{R} + P\bar{Q}\bar{R}$

$= m_7 + m_6 + m_2 \quad m_4$

$\therefore$ (A) is the answer.

7. # Ram chips needed = $\frac{\text{Memory size}}{\text{Chip size}}$

$= \frac{4MB}{1M \times 1b}$

$= \frac{4\cancel{M} \times 8\cancel{b}}{1\cancel{M} \times 1\cancel{b}}$

$\therefore$ # ram chips needed = 32

Time taken to refresh 1 chip = 1K × 1K × 100ns

$2^{20} \times 100$ ns

$\therefore$ Total time = Time taken to refresh 32 chips

$= 32 \times 2^{20} \times 100$ ns

$= 3200 \times 2^{20}$ ns

(D) is the answer.

8. $2's$ complement representation of P is $(F87B)_{16}$

P = 1111 1000 0111 1011

To calculate 8 * P, perform three left shift operations on P as 1 left shift results in multiplying the number by 2.

2 * P = P < < 1 = 1111 0000 1111 0110

4 * P = P < < 1 = 1110 0001 1110 1100

8 * P = P < < 1 = 1100 0011 1101 1000

$\therefore$ 8 * P = $(C\ 3\ D\ 8)_{16}$

(A) is the answer.

9. $f = \bar{P}\bar{Q}I_0 + \bar{P}QI_1 + P\bar{Q}I_2 + PQI_3$

$= \bar{P}\bar{Q}R + \bar{P}Q\bar{R} + P\bar{Q}\bar{R} + PQR$

$= \bar{P}(\bar{Q}R + Q\bar{R}) + P(\bar{Q}\bar{R} + QR)$

Let $\bar{Q}R + Q\bar{R} = X \quad \therefore \bar{Q}\bar{R} + QR = \bar{X}$

$\therefore f = \bar{P}X + P\bar{X}$

$= P \oplus X$

$= P \oplus (\bar{Q}R + Q\bar{R})$

$= P \oplus Q \oplus R$

$\therefore$ (B) is the answer.

10. It given that

(i) Every node has an odd number of descendants.

(i) Every node is considered to be its own descendant.

Which means that every node must have an even number of descendants (excluding itself).

Hence, a node with one child is never possible as the node will then have an odd number of descendants.

Thus, the generated tree is always a fully binary tree i.e. a tree having 0 or even number of children.

$\therefore$ (A) is the answer.

11.
```
int i = 0, j = 1;
int main ( ) {
f (&i, &j);                    // Address of variables i & j are passed
printf (" % d \ n", i, j);
return 0;
```

```
}
void f (int * p, int * q)  {                    i = 0  j = 1  2
p = q;                    // p also points to q      p    q
* p = 2;                    q
}
```

$\therefore$ i = 0 and j = 2 is printed

(D) is the answer.

12. Start with the smallest value among the options

Let k = 5

Records = $10^k = 10^5$

Processing time for package A $= 0.0001\ n^2$

$= 0.0001\ (10^5)^2$

$= 10^6$ units

Processing time for package B $= 10n \log_{10} n$

$= 10 \times 10^5 \log_{10} 10^5$

$= 5 \times 10^6$ units

$\therefore$ P.T. (B) > P.T. (A)

Hence A will be preferred over B.

Let k = 6

Records = $10^k = 106$

Processing time for package A $= 0.0001\ n^2$

$= 0.0001 \times (10^6)^2$

$= 10^8$ units

Processing time for package B $= 10n \log_{10} n$

$= 10 \times 10^6 \log_{10} 10^6$

$= 6 \times 10^7$ units

$\therefore$ P.T. (B) < P. T. (A)

Hence B will be preferred over A

$\therefore$ Smallest value of k is 6

(C) is the answer.

13. Symbol table is a data structure used by language translator such as a compiler or interpreter where each identifier (symbol) in a program's source code is associated with information relating to its declaration or apperance in the source.

(B) is the answer.

14. Heap allocation is used in languages that allow dynamic data structures. Heap is used to

dynamically allocate memory.

(C) is the answer.

15. TTL value is used to avoid indefinite looping of packets in the network. At every hop of the router the TTL value is decremented by one. When TTL becomes 0, no further hops of the packet are possible. Maximum number of hops of the packet are limited by the initial value of TTL field.

(D) is the answer.

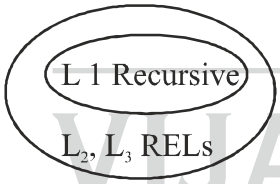
16. Ping is used to test the reachability of a host or an Internet Protocol (IP) network. It measures the round-trip time for messages sent from the originating host to a destination computer that are echoed back to the source.

Rest all are client server applications

(D) is the answer.

17. L1 – Recursive language

L2, L3 – RELs but not recursive



$\overline{L1}$ is recursive as well $\overline{L2}$, $\overline{L3}$ are not RELs as RELs are not closed under complementation.

(A) L2 – L1 = $L2 \cap \overline{L1}$

= REL $\cap$ recursive

= REL $\therefore$ always true

(B) L1 – L3 = L1 $\cap$ $\overline{L3}$

= Recursive $\cap$ Non Recursively enumerable

$\neq$ REL

$\therefore$ (B) is not always true as $\overline{L3}$ may or may not be REL

(C) L2 $\cap$ L1 = REL $\cap$ recursive

= REL $\therefore$ always true

(D) L2 $\cup$ L1 = REL $\cup$ recursive

= REL $\therefore$ always true

(B) is the answer.

18. Maximum no. of keys in a B+ tree = 5

$\therefore$ order p = 6

Minimum order of any non root node (p_{min}) = $\frac{p}{2}$ = 3

$\therefore$ Minimum no. of keys = $p_{min} - 1 = 3 - 1 = 2$

(B) is the answer.

19. The outer query selects pids where class = 'AC'

There are 4 such pids i.e. 0, 1, 3, 5

The inner query performs natural join of the two tables over 'pid' which results in 3 tuples i.e. 0, 1, 3 pids.

Now it selects the pids where age > 65

i.e. pids 1 and 3

(C) is the answer.

20. 2PL locking ensures serializability but does not guarantee freedom from deadlock.

Deadlock may occur by making use of conflicting locks.

Time stamp ordering ensures both serializability as well as freedom from deadlock.

(B) is the answer.

21. It is given that cyclomatic complexity of modules A and B is 10.

Cyclomatic complexity of a module = number of decision points + 1

Number of decision points in A and B = 10 – 1

= 9

$\therefore$ Cyclomatic complexity of sequential integration of A and B

= (9 + 9) + 1

= 19

(A) is the answer.

22. (B) is the answer.

23.

P1	P2
while (S1 = = S2)	while (S1 ! = S2)
{ };	{ };
CS	CS
S1 = S2;	S2 = not (S1);

Mutual exclusion is satisfied as either of S1 = = S2 or S1! = S2 will be true and accordingly P2 and P1 will enter the critical section respectively.

To check if progress is satisfied or not, check that if a process enters critical section again (i.e. just after previously executing the critical section)

It is not possible to have progress in this case as after P1 comes out of critical section, it executes S1 = S2 and the conditon of while loop because true (i.e. it can never execute the critical section again).

Similar is the case with P2

$\therefore$ Progress is not satisfied.

(A) is the answer.

24. First 100 pages will cause 100 page faults.

Now when they are acessed in reverse order, the initial 4 pages will result in page hits and the remaining will cause page faults.

$\therefore$ Total page faults = 100 + (100 – 4) = 196

(A) is the answer.

25. (I) is true as SRTF may result in starvation of longer jobs.

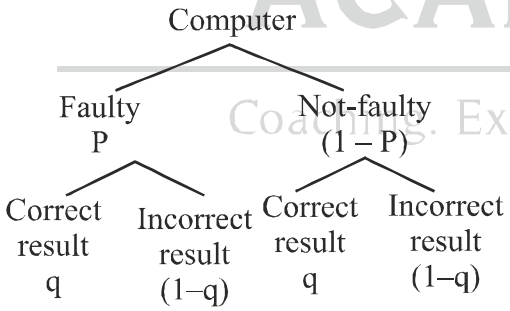
(II) is true as a process may get preempted every time if it is a low priority process resulting in starvation.

(III) is true as Round Robin improves response time of all process due to quantum time.

$\therefore$ (D) is the answer

TECHNICAL SECTION (Q. NO. 26 – 55) 2 MARKS

26.



A computer can be declared faulty when :

(i) It is faulty and the result is correct i.e. p q.

(ii) It is not faulty and the result is incorrect

i.e. (1 – p) (1 – q)

Hence, required probability = pq + (1 – p) (1 – q)

(A) is the answer.

27. Divisors of 10^{99}

$10^{99} = 2^{99} \times 5^{99}$

Hence total divisors $= (99 + 1)(99 + 1)$

$= 100 \times 100 = 10000$

Multiples of 10^{96}

Total multiples $= \dfrac{10^{99}}{10^{96}}$

$= 10^3$

$= 2^3 5^3$

Hence total divisors of $10^3 = (3 + 1)(3 + 1)$

$= 4 \times 4$

$= 16$

Probability that divisor of 10^{99} is a multiple of $10^{96} = \dfrac{16}{10000} = \dfrac{1}{625}$

(A) is the answer.

28. Havel-Hakimi theorem is used in solving the graph realization problem, i.e. the question if there exists for a finite list of non-negative integers a simple graph such that its degree sequence is exactly this list. For a positive answer, the list of integers is called graphic.

Let $S = \{d_1, d_2, \ldots\ldots d_n\}$ be a finite list of non-negative integers that is non-increasing list S is graphic if and only if the finite list $S' = \{d_2 - 1, d_3 - 1 \ldots\ldots, d_{d_1+1} - 1, d_{d_1+2}, \ldots. d_n\}$ has non-negative integers ans is graphic.

Now, consider the given sequences :

I. 7, 6, 5, 4, 4, 3, 2, 1

= 5, 4, 3, 3, 2, 1, 0

= 3, 2, 2, 1, 0, 0

= 1,1,0,0,0

Hence it is graphic.

II. 6, 6, 6, 3, 3, 2, 2

= 5, 5, 5, 2, 2, 1, 2

= 5, 5, 5, 2, 2, 2, 1 (Arranged in non-increasing order)

= 4, 4, 1, 1, 1, 1

= 3, 0, 0, 0, 1

= 3, 1, 0, 0, 0

= 0, –1, –1, 0

Thus it is not graphic due to negative integers.

III. 7, 6, 6, 4, 4, 3, 2, 2

= 5, 5, 3, 3, 2, 1, 1

= 4, 2, 2, 1, 0, 1

= 4, 2, 2, 1, 1, 0

= 1, 1, 0, 0, 0

Hence it is graphic.

IV. 8, 7, 7, 6, 4, 2, 1, 1

Here degree of vertex is 8 and total number of vertices are also 8. Hence it is not possible to apply this theorem here.

So, it is not graphic.

(D) is the answer.

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

Σ (Eigen values) = Trace (A)

$\therefore \quad 4 + 8 = 2 + y$

$y = 10$

π (Eigen values) = |A|

$\therefore \quad 4 \times 8 = 2y - 3x$

$\therefore \quad 32 = 2(10) - 3x$

$\therefore \quad 3x = -12$

$\therefore \quad x = -4$

$x = -4$ and $y = 10$

(D) is the answer.

30. The given expression is :

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

which means No person can fool every person all the time.

(B) is the answer.

31. We can conclude that the given circuit is symmetrical.

Let us consider upper there NOR Gates

$$\left.\begin{aligned} \therefore U &= \overline{\overline{P+Q}} + \overline{\overline{Q+R}} \\ &= \overline{\overline{PQ} + \overline{QR}} \\ &= \overline{\overline{P}\,\overline{Q}}.\overline{\overline{Q}\,\overline{R}} \\ &= (P+Q)(Q+R) \end{aligned}\right\} \text{ using De-Morgan's laws}$$

Similarly lower part will simplify as

$L = (P + R)(Q + R)$ (By symmetry)

$\therefore f = \overline{(P + Q)(Q + R) + (P + R)(Q + R)}$

$= \overline{Q + PR + R + PQ}$ $(\because (A + B)(A + C) = A + BC)$

$= \overline{Q(1 + P) + R(1 + P)}$

$\therefore F = \overline{Q + R}$

(A) is the answer.

32. For a T flip flop,

T	Q
0	Q
1	$\overline{Q}$

On analysing the circuit, we get

$Q_{0new} = \overline{Q_0}$

$Q_{1new} = \overline{Q_1}$; if $Q_0 \rightarrow Q_{0new}$ is from 0 to 1

$= Q_1$; elsewhere

Q_1	Q_0	Q_{1new}	Q_{0new}
0	0	1	1
1	1	1	0
1	0	0	1
0	1	0	0

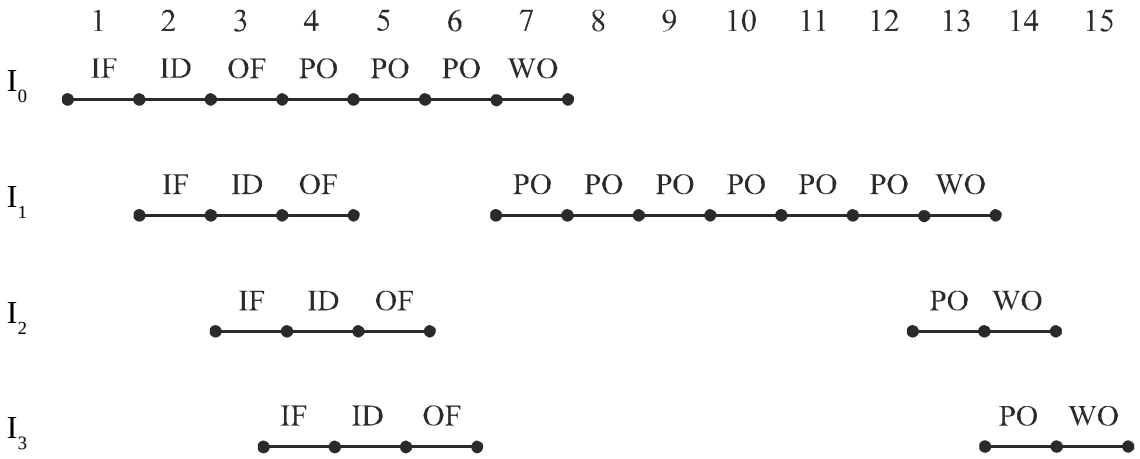
Hence the sequence of outputs of Q_1 Q_0 is 11, 10, 01, 00.

(A) is the answer.

33. No. of cycles for each stage of instruction

	IF	ID	OF	PO	WO
I_0	1	1	1	3	1
I_1	1	1	1	6	1
I_2	1	1	1	1	1
I_3	1	1	1	1	1

Using operand forwarding technique, the pipeline will be as follows :



$\therefore$ Total 15 clock cycles are needed to execute the given sequence of instructions

(B) is the answer.

34. Using dynamic programming, we can find the maximum possible weight of the subsequence in the following ways:

(i) When a_0 is not included in the sequence, then maximum possible weight of the subsequence $\{a_1,a_2,a_3....a_{n-1}\}$ is Y

(ii) When ao is inclued in the sequence, then maximum possible weight of the subsequence $\{a_0,a_1,a_2....a_{n-1}\}$is a_0 + Y/2 [as the weight of sequence $\{a_0,a_1....a_{n-1}\}$ is $a_0+\frac{a_1}{2}+\frac{a_2}{2^2}+.....\frac{a_{n+1}}{2^{n-1}}$ Hence each number in sequence Y will be divided by 2]

$\therefore$ x = max (Y, a_0+ Y/2)

(B) is the answer.

35. let a =

12	7	13	4	11	6
100	104	108	112	116	120

as each integer will occupy 4 bytes

= f (a,6)

= f (*100,6)

=12+ f (*104,5)

=12+7-(f(*108,4))

=12+7-(13-(f(*112,3)))

=12+7-(13-(4+f(*116,2)))

=12+7-(13-(4+11-(f(*120,1))))

=12+7-(13-(4+11-(6+f (*124,0))))

=12+7-(13-(4+11-(6)))

=15

(C) is the answer.

36. The linked list will be traversed until the end of the while loop. At the end of the while loop, p contains address of last node and q contains address of second last node so to modify the list as required , we need to perform the following operations :

(1) Set the next of q to Null i.e. $q \rightarrow$ next = Null

(2) Set the next of p as head i.e $p \rightarrow$ next = head

(3) make head as p i.e. head = p

(2) Must be performed before (3). We cannot change head first as we do not want to lose the head node of original linked list.

(D) is the answer.

37. Since a, b and c all have different values. So we need atleast 3 registers (R_1,R_2 and R_3) let R_1 contain the value of a, R_2 contain the value of b and R_3contain the value of c.

Consider d = a + b. We know that the value of 'a' hasn't been used in further computations. Hence we can do $R_1 \leftarrow R_1 + R_2$ similarly we can check for subsequent lines of computation.

Finally we have,

R1 = 1
R2 = 10
R3 = 20
R1 = R1+R2
R1 = R1+R3
R2 = R3+R1
R2 = R3+R1
R1 = R2+R2
R1 = 5+R1
return (R3+R2)

$\therefore$ We need only 3 registers to execute this program without spilling

(B) is the answer.

38. To check the grammar for LL (1), we see

first (aSa) = a

first (bS) = b

first (c) = c

Thus the first of all grammar rules are mutuallly exclusive. Hence there would be not no multiple entries in the predictive parsing table. So the grammar is LL (1).

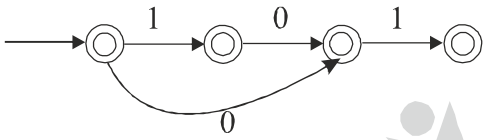
As the grammar is LL (1), then by default if is LR (1) as well because LR parsers have high power as compased to LL (1) parsers.

$\therefore$ (C) is the answer.

39. (A) is incorrect because it cannot accept strings with even number of 1s and ending in o
(B) is the correct answer
(C) is incorrect because it accepts the string '1'
(D) is incorrect because it cannot accpet the string '10111'.

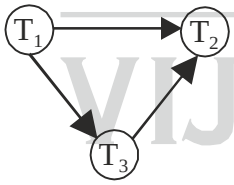
40. All the given languages are context free as there is some relation between two alphabets.
(D) is the answer.

41. Consider the string '101'
Substrings of 101 = { ε ,1,10,101,01}
To construct a NFA that accepts substrings of the string 101, we require 4 states NFA :



$\therefore$ For a string of length 'n' we require a NFA of 'n + 1' states to accept the language L.
(C) is the answer.

42.



Note : The topological ordering of a precedence graph is guaranteed to yield a serializable schedule
$\therefore$ Topological ordering of the graph is < $\mathbf{T}_1$, T_3 , T_2 > .
(A) is the answer.

43. From the given functional dependencies,we can conclude that 'B' is the candidate key of R. Hence each tuple in R will have a unique value of B. Thus we have 200 unique values of B. However S has only 100 types, out of which each type will have same value of B or different values of B . To get the maximum tuples in $R \bowtie S$, all the tuples in S should have values of B that are present in R as well. Hence we can have the maximum number of tuples in $R \bowtie S$as 100.
(A) is the answer.

44. T1 covers S1
T2 covers S3
T3 covers S1
T4 covers S2,S4
Hence to cover all statements, test suites should be chosen as T1,T2,T4 or T3,T2,T4
(D) is the answer.

45. Initially only process P0 can enter the loop as S0 = 1 but S1 and S2 are 0. Hence P0 will print 0 and release S1 and S2. Then ither of P1 and P2 will execute and release P0 which will print 0 again . Hence the process P0 prints '0' atleast twice.
(A) is the answer.

46. From the given implementation of resource request logic, it is clear that all even number processes request even numbered resources and they share not more than one resource.

Now we have to ensure that all odd numbered processes request odd number of resources without forming a cycle. But if n is odd, R_{n-i} and R_{n-i-2} will be even and this may result in a dedlock when two processes request the same resources R_i and R_j. So we have to check where n is odd i.e. options (B) and (D) only

Consider option (B)

n = 21 k = 12

i.e. 21 resources and 12 processes

P0 – requests R_0 and R_2

P2 – requests R_2 and R_4

P8– requests R_8 and R_{10}

P10 – requests R_{10} and R_{12}

P1– requests R_{21-1} ,i.e. R_{20} and R_{21-1-2} i.e. R_{18}

P3– requests R_{18} and R_{16}

P7– requests R_{14} and R_{12}

P9– requests R_{12} and R_{10}

Here processes P10 and P9 share the same set of resources R10 and R12 which may result in a deadlock

$\therefore$ (B) is the answer

47. Bothe the IP addresses of A and B belong to class A. Also the first three octects will be same. We will check for the last octet.

(A)
$$\begin{array}{r} 113 \\ \wedge\ 0 \\ \hline 0 \end{array} \qquad \begin{array}{r} 91 \\ \wedge\ 0 \\ \hline 0 \end{array}$$
$\therefore$ A and B belong to the same network

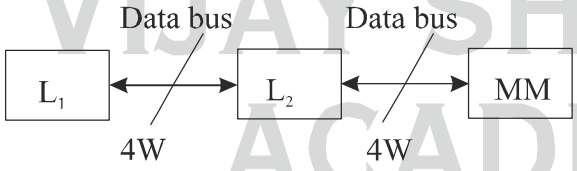
(B)
$$\begin{array}{r} 113 \\ \wedge 128 \\ \hline 0 \end{array} \qquad \begin{array}{r} 91 \\ \wedge 128 \\ \hline 0 \end{array}$$
$\therefore$ A and B belong to the same network

(C)
$$\begin{array}{r} 113 \\ \wedge 192 \\ \hline 128 \end{array} \qquad \begin{array}{r} 91 \\ \wedge 192 \\ \hline 128 \end{array}$$
$\therefore$ A and B belong to the smae network

(D)
$$\begin{array}{r} 113 \\ \wedge 224 \\ \hline 96 \end{array} \qquad \begin{array}{r} 91 \\ \wedge 224 \\ \hline 64 \end{array}$$
$\therefore$ Here A and B do not belong to the same network

$\therefore$ (D) is the answer.

48.



Memory access time of L1 = 2 ns

Memory access time of L2 = 20 nsec.

Data bus size = 4 words

When there is a miss in L1 and a hit in L2, (i.e. we need to access L1 first and then L2) the access time is calculated as:

2	Access time of L1 cache
20	Access time of L2 cache
2	Access time of L1 cache
20	Access time of L2 cache
2	Access time of L1 cache
20	Access time of L2 cache
2	Access time of L1 cache
20	Access time of L2 cache
88 n sec	

As the block size of L2 cache is 16 words whereas the block size in L1 cache is 4 words, we need to transfer a block 4 times of size 4 words each from L2 to L1

$\therefore$ (D) is the answer.

49. When there is a miss in L1 and L2 cache then a block is transfered from MM to L2 cache and then from L2 cache to L1 cache.

$\therefore$ Total transfer time

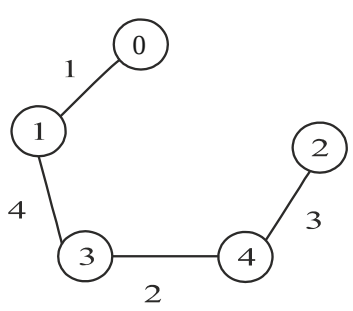
= Block transfer time from main memory to L2 cache + Block transfer time from L2 to L1

So the total transfer time is calculated as

2	Access time of L1 cache
20	Access time of L2 cache
200	Access time of MM
20	Access time of L2 cache
200	Access time of MM
20	Access time of L2 cache
200	Access time of MM
20	Access time of L2 cache
2	Access time of L1 cache
20	Access time of L2 cache
2	Access time of L1 cache
20	Access time of L2 cache
2	Access time of L1 cache
20	Access time of L2 cache
968 n sec	

(D) is the answer.

50. For 0 as a leaf node, the minimum spanning tree is as follows :



$\therefore$ Weight of MST = 1 + 4 + 2 + 3 = 10

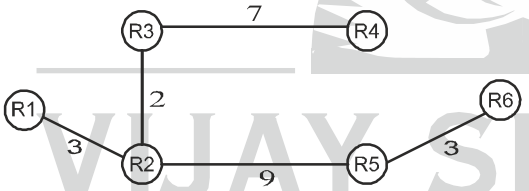
(D) is the answer

51. The required path is $1 \rightarrow 0 \rightarrow 4 \rightarrow 2$
weight of the path = 1 + 4+ 3 = 8
(B) is the answer.

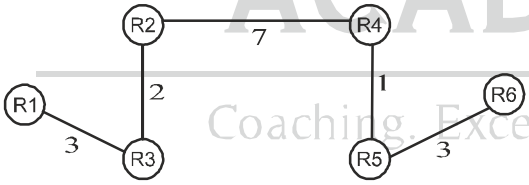
52. (A) is incorrect as 52 appears before 23 in this sequence
(B) is incorrect as 33 appear beofre 46 in this sequence
(C) is correct as 52 should appear after 42, 23 and 34 where as 33 should appear after 52 and 46. Hence we get the given hash table .
(D) is incorrect as 33 appears before 23 in this sequence.

53. In a valid insertion sequence to produce the given hash table, we have the following cases:
Case I : _ _ _ 52 46 33 _ - 3! ways
Case II : _ _ _ 52 33 _ - 4! ways
$\therefore$ Total valid insertions = 3! + 4!
= 6+24
= 30
(C) is the answer.

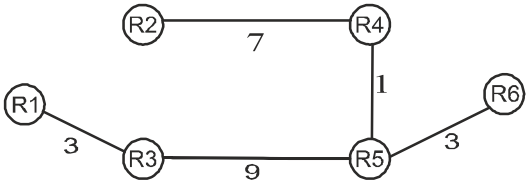
54. Routing table R1 and R3 is same



Routing table of R2 and R4 is same

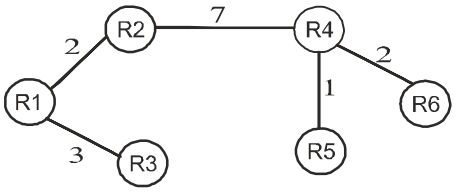


Routing table of R5 and R6 is same

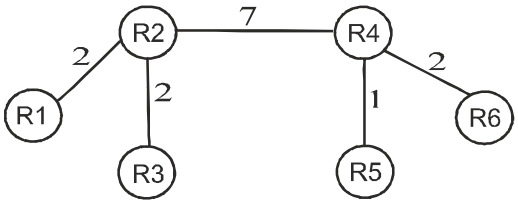


Thus we can see that of all the links, only 2 are unused. They are R1 – R2 and R4– R6
$\therefore$ (C) is the answer.

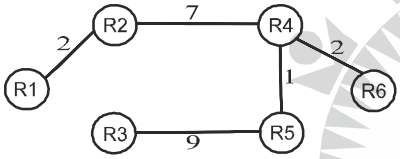
55. If the weights of unused links (i.e. R1– R2 and R4 – R5) are changed to 2 , we can see that following changes happening.
Routing table of R1 and R3 are same



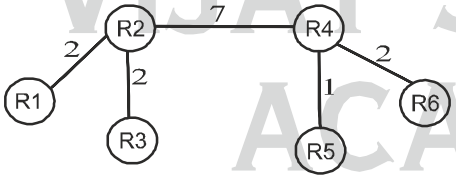
Routing table of R2 and R4 same



Routing table of R5



Routing table of R6



Thus in this case we can see that, of all the possible links, only one link remains unused i.e. R5 – R6.

(B) is the answer.

GENRAL APTITUDE SECTION (Q. NO. 56 – 65) 15 MARKS

56. (C) is the answer

57. Circuitous is an adjective meaning 'longer than the most direct way' Synonyms are roundabout, indirect,winding, meandering.

(B) is the answer.

58. 'Conserve' is the most appropriate word.

(D) is the answer.

59. By principle of inclusion & exclusion,

$n(F \cup H) = n(F) + n(H) - n\ F \cap H)$

$= 17 + 15 - 10$

$= 22$

$\therefore$ No. of persons playing niether hockey nor football $= 25 - 22$

$= 3$

(D) is the answer

60. An unemployed worker is the one not having a job. Similarly fallow land is the land which is not used for only kind of cultivation.
(A) is the answer.

61. It is given that $134 + 276 = 435$
Consider adding the units place, we know that $7 + 6 = 13$. But the given answer has 5 in the units place. Hence we can conclude that the base used here is '8'
$\because \quad (15)_8 = (13)_{10}$
So perform the addition in base system '8'

$$\begin{array}{r} 731 \\ +\ 672 \\ \hline 1623 \end{array}$$

$7 + 3 = (10)_{10} = (12)_8$
$7 + 7 = (14)_{10} = (16)_8$
(C) is the answer.

62. As per the given conditions, we have
(1) $H + G > S + I$
(2) No twins
(3) Either of $S - G = 1$ or $G - S = 1$
(4) G is not the oldest and S is not the youngest
Now test each of the options
(A) HSIG is not possible as Geeta and Saira must be consecutive as their age difference is 1
(B) SGHI
Let Saira's age be 'x'
$\therefore$ Geeta age $= x - 1$
Hari's age $= x - 4$ (since maximum age difference could be 3)
Similarly Irfan's age $= x - 4 - 3 = x - 7$
$H + G > S + I$
$x - 4 + x - 1 > x + x - 7$
$2x - 5 > 2x - 7$
True and it satisfies all the 4 conditions
$\therefore$ (B) is the answer.
Similarly, you can test the other two options.
They turn out to be false.

63. 5 skilled worker can build a wall in 20 days

$\therefore$ 1 skilled worker can build the same wall in $5 \times 20 = 100$ days

So, capacity of each skilled workers $= \frac{1}{100}$ days.

8 semi–skilled worker can build a wall in 25 days

$\therefore$ 1 semi–skilled workers can build the same wall in $25 \times 8 = 200$ days.

So capacity of one semi –skilled worker $= \frac{1}{200}$ days.

10 unskilled workers can build a wall in 30 days.

$\therefore$ 1 unskilled worker can build a wall in $30 \times 10 = 300$ days.

So capacity of one unskilled worker $= \frac{1}{300}$ days.

$\therefore$ Capacity of 2 skilled, 6 semi-skilled and 5 unskilled workers

$$= \frac{2}{100} + \frac{6}{200} + \frac{5}{300}$$

$$= \frac{1}{15} \text{ days}$$

$\therefore$ Number of days taken to build the wall is 15 days.

(D) is the answer.

64. Only option (D) sums the meaning of the given passage. The last line of the passage clearly states that there exist people in military establishment who think that chemical agents are useful tools for their cause.

$\therefore$ (D) is the answer.

65. To form a 4 digit number greates than 3000, well have the first digit either as 3 or 4

Case I : First digit is 3 –

3_ _ _

We have rest of the number from the list 2,2,3,3,3,4,4,4.

Hence total number possible = $3 \times 3 \times 3 - 2 = 25$

(excluding the 3–digit sequences 222 and 333)

Case II : First digit is 4 –

4_ _ _

We have rest of the numbers from the list 2,2,3,3,3,4,4,4

Hence total numbers possible = $3 \times 3 \times 3 - 1 = 26$

(excluding the 3 – digit sequence 222)

$\therefore$ Total distinct 4 – digit numbers possible = 25 + 26 =51.

(B) is the answer.