PAPER : DEC. 2019

UGC-NET COMPUTER SCIENCE & APPLICATIONS (87)

PAPER-II

Note: This paper contains **fifty(50)** objective type questions for **two (2)** marks each. **All** questions are compulsory. The candidates are required to select the most appropriate answer of each question.

1. According to Dempster-Shafer theory for uncertainty management,

(a) $Bel(A) + Bel(\neg A) \leq 1$ (b) $Bel(A) + Bel(\neg A) \geq 1$

(c) $Bel(A) + Bel(\neg A) = 1$ (d) $Bel(A) + Bel(\neg A) = 0$

Where *Bel*(*A*) denotes Belief of event *A*.

2. Match **List-I** and **List-II**

List-I	**List-II**
(A) Isolated I/O	(i) Same set of control signal for I/O and memory communication.
(B) Memory mapped I/O	(ii) Separate instructions for I/O and memory communication.
(C) I/O interface	(iii) Requires control signals to be transmitted between the communicating units.
(D) Asynchronous data transfer	(iv) Resolve the differences in central computer and peripherals.

(a) (A)-(ii), (B)-(iii), (C)-(iv), (d)-(i) (b) (A)-(i), (B)-(ii), (C)-(iii), (d)-(iv)

(c) (A)-(ii), (B)-(i), (C)-(iv), (d)-(iii) (d) (A)-(i), (B)-(ii), (C)-(iv), (d)-(iii)

3. Piconet is a basic unit of a bluetooth system consisting of _____ master node and up to _____ active slave nodes.

(a) one, five (b) one, seven (c) two, eight (d) one, eight

4. Let *P* be the set of all people. Let *R* be a binary relation on *P* such that (*a*,*b*) is in R if a is *a* brother of *b*. Is *R* symmetric transitive, an equivalence relation, *a* partial order relation?

(a) NO, NO, NO, NO (b) NO, NO, YES, NO

(c) NO, YES, NO, NO (d) NO, YES, YES, NO

5. The Boolean expression $AB + A\overline{B} + \overline{A}C + AC$ is unaffected by the value of the Boolean variable_____.

(a) *A* (b) *B* (c) *C* (d) *A*, *B* and *C*

6. Consider the following grammars:-

$G_1 : S \rightarrow aSb \mid bSa \mid aa$

$G_2 : S \rightarrow aSb \mid bSa \mid SS \mid \lambda$

$G_3 : S \rightarrow aSb \mid bSa \mid SS \mid a$

$G_4 : S \rightarrow aSb \mid bSa \mid SS \mid SSS \mid \lambda$

Which of the following is correct w.r.t. the above grammars?

(a) G_1 and G_3 are equivalent (b) G_2 and G_3 are equivalent

(c) G_2 and G_4 are equivalent (d) G_3 and G_4 are equivalent

7. The time complexity to multiply two polynomials of degree *n* using Fast Fourier transform method is:

(a) $\theta(n\lg n)$ (b) $\theta(n^2)$ (c) $\theta(n)$ (d) $\theta(1gn)$

8. Let W_{ij} represents weight between node *i* at layer *k* and node *j* at layer (*k–1*) of a given multilayer perception. The weight updation using gradient descent method is given by
(Where α and *E* represents learning rate and Error in the output respectively)

(a) $W_{ij}(t+1)=W_{ij}(t)+\alpha\frac{\partial E}{\partial W_{ij}}, 0\le\alpha\le 1$ (b) $W_{ij}(t+1)=W_{ij}(t)-\alpha\frac{\partial E}{\partial W_{ij}}, 0\le\alpha\le 1$

(c) $W_{ij}(t+1)=\alpha\frac{\partial E}{\partial W_{ij}}, 0\le\alpha\le 1$ (d) $W_{ij}(t+1)=-\alpha\frac{\partial E}{\partial W_{ij}}, 0\le\alpha\le 1$

9. Let the population of chromosomes in genetic algorithm is represented in terms of binary number. The strength of fitness of a chromosomes in decimal form, *x*, is given by

$$S\ f(x)=\frac{f(x)}{\sum f(x)} \text{ where } f(x)=x^2$$

The population is given by *P* where: $P=\{(01101),(11000),(01000),(10011)\}$
The strength of fitness of chromosome (11000) is _____.
(a) 24 (b) 576 (c) 14.4 (d) 49.2

10. How many reflexive relations are there on a set with 4 elements?
(a) 2^4 (b) 2^{12} (c) 4^2 (d) 2

11. Consider the following statements with respects to the language $L=\{a^nb^n \mid n\ge 0\}$

S1 : L^2 is context free language

S2 : L^k is context free language for any given $k\ge 1$

S3 : $\bar{L}$ *and* L^* are context free language
Which one of the following is correct?
(a) S1 and S2 only (b) S1 and S3 only (c) S2 and S3 only (d) S1, S2 and S3

12. Consider a weighted directed graph. The current shortest distance from *S* to nodes *x* is represented by $d[x]$. Let $d[v]=29, d(u)=15\ w[u,v]=12$. What is the updated value of $d[v]$ based on current information?
(a) 29 (b) 27 (c) 25 (d) 17

13. Which of the following class of IP address has the last address as 223.255.255.255?
(a) Class A (b) Class B (c) Class C (d) Class D

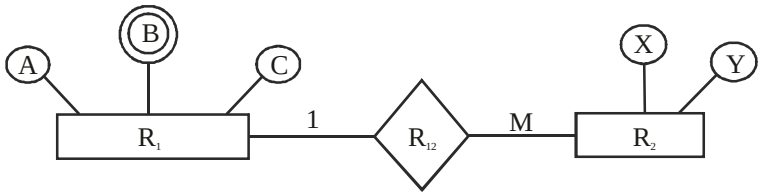
14. Which of the following are legal statements in C programming language?
(1) int * P = &44; (2) int * P = &r;
(3) int P = &a; (4) int P = a;
Choose the correct option
(a) (1) and (2) (b) (2) and (3) (c) (2) and (4) (d) (1) and (4)

15. Consider the language $L=\{a^nb^{n-3} \mid n>2\}$ on $\sum=\{a,b\}$. Which one of the following grammars generates the language *L*?

(a) $S\to aA\mid a, A\to aAb\mid b$ (b) $S\to aaA\mid\lambda, A\to aAb\mid\lambda$

(c) $S\to aaaA\mid a, A\to aAb\mid\lambda$ (d) $S\to aaaA, A\to aAb\mid\lambda$

16. Find minimum number of tables required for converting the following entity relationshilp diagram into relational database?



(a) 2 (b) 4 (c) 3 (d) 5

17. In a B-Tree, each node represents a disk block. Suppose one block holds 8192 bytes. Each key uses 32 bytes, In a B-tree of order M there are M – 1 keys Since each branch is on another disk block. we assume a branch is of 4 bytes. The total memory requirement for a non-leaf node is
(a) 32 M – 32 (b) 36 M – 32 (c) 36 M – 36 (d) 32 M – 36

18. Consider the following Linear programming problem (LPP):
Maximize $z = x_1 + x_2$
Subject to the constraints
$x_1 + 2x_2 \le 2000$
$x_1 + x_2 \le 1500$
$x_2 \le 600$
and $x_1, x_2 \ge 0$
The solution of the LPP is:
(a) $x_1 = 750,\ x_2 = 750,\ z = 1500$ (b) $x_1 = 500,\ x_2 = 1000,\ z = 1500$
(c) $x_1 = 1000,\ x_2 = 500,\ z = 1500$ (d) $x_1 = 900\ x_2 = 600,\ z = 1500$

19. A clique in an undirected graph $G = \langle V, E \rangle$ is a subset $V' \subseteq V$ of vertices, such that
(a) If $(u, v) \in E$ then $u \in V'$ and $v \in V'$
(b) If $(u, v) \in E$ then $u \in V'$ or $v \in V'$
(c) Each pair of vertices in V' is connected by an edge
(d) All pair of vertices in V' are not connected by an edge

20. What is the output of following C program?

```
# include <stdio.h>
main ( )
{
    int i, j, x = 0;
    for (i = 0; i < 5; ++i)
    for (j = 0; j < 5; ++j)
    {
    x + = (i + j – 1);
    break;
    }
    printf ("%d", x);
}
```

(a) 6 (b) 5 (c) 4 (d) 3

21. A rectangle is bound by the lines $x = 0$; $y = 0$; $x = 5$ and $y = 3$. The line segment joining $(-1, 0)$ and $(4, 5)$, if clipped against this window will connect the points _____.

(a) $(0,1)$ and $(3,3)$ (b) $(0,1)$ and $(2,3)$ (c) $(0,1)$ and $(4,5)$ (d) $(0,1)$ and $(3,5)$

22. Match the Agile Process models with the task performed during the model:

List-I	List-II
(A) Scrum	(i) CRC cards
(B) Adaptive software development	(ii) Sprint backlog
(C) Extreme programming	(iii) <action> the <resul> <by/for/of/to> *a*(*n*) <object>
(D) Feature-driven development	(iv) Time box release plan

Choose the correct option from those given below:

(a) (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii) (b) (A)-(i), (B)-(iii), (C)-(ii), (D)-(iv)
(c) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii) (d) (A)-(i), (B)-(iv), (C)-(ii), (D)-(iii)

23. A basic feasible solution of an $m \times n$ transportation problem is said to be non-degenerate. if basic feasible solution contains exactly _____ number of individual allocation in _____ positions.

(a) $m + n + 1$, independent (b) $m + n - 1$, independent
(c) $m + n - 1$, appropriate (d) $m - n + 1$, independent

24. A computer uses a memory unit of 512 K words of 32 bits each. A binary instruction code is stored in one word of the memory. The instruction has four parts: an addressing mode field to specify one of the two-addressing mode (direct and indirect), an operation code, a register code part to specify one of the 256 registers and an address part. How many bits are there in addressing mode part, opcode part, register code part and the address part?

(a) 1, 3, 9, 19 (b) 1, 4, 9, 18 (c) 1, 4, 8, 19 (d) 1, 3, 8, 20

25. The order of schema ?10?101? and ???0??1 are _____ and _____ respectively.

(a) 5,3 (b) 5,2 (c) 7,5 (d) 8,7

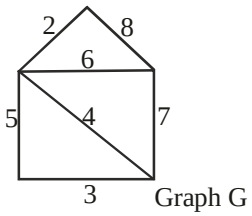
26. Java Virtual Machine (JVM) is used to executive architectural neutral byte code. Which of the following is needed by the JVM for execution of Java code?

(a) Class loaded only (b) Class loader and Java Interpreter
(c) Class loader, Java Interpreter and API (d) Java Interpreter only

27. Consider the following models:
M1: Mamdani model
M2: Takagi–Sugeno–Kang model
M3: Kosko's additive model (SAM)
Which of the following option contains examples of additive rule model?

(a) M1 and M2 only (b) M2 and M3 only
(c) M1 and M3 only (d) M1, M2 and M3

28. The weight of minimum spanning tree in graph G, calculated using Kruskal's algorithm is:



Graph G

(a) 14 (b) 15 (c) 17 (d) 18

29. Match List-I with List-II

List-I	List-II
(A) Frame attribute	(i) to create link in HTML
(B) <tr> tab	(ii) for vertical alignment of content in cell
(C) Valign attribute	(iii) to enclose each row in table
(D) <a> tag	(iv) to specify the side of the table frame that display border

Choose the correct option from those given below:

(a) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv) (b) (A)-(ii), (B)-(i), (C)-(iii), (D)-(iv)
(c) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i) (d) (A)-(iii), (B)-(iv), (C)-(ii), (D)-(i)

30. Consider a paging system where translation look aside buffer (TLB) a special type of associative memory is used with hit ratio of 80%.
Assume that memory reference takes 80 nanoseconds and reference time to TLB is 20 nanoseconds.
What will be the effective memory access time given 80% hit ratio?
(a) 110 nanoseconds (b) 116 nanoseconds (c) 200 nanoseconds (d) 100 nanoseconds

31. Consider the following language families:

$L_1 \equiv$ The context – free languages

$L_2 \equiv$ The context – sensitive languages

$L_3 \equiv$ The recursively enumerable languages

$L_4 \equiv$ The recursive languages

Which one of the following options is correct?

(a) $L_1 \subseteq L_2 \subseteq L_3 \subseteq L_4$ (b) $L_2 \subseteq L_1 \subseteq L_3 \subseteq L_4$ (c) $L_1 \subseteq L_2 \subseteq L_4 \subseteq L_3$ (d) $L_2 \subseteq L_1 \subseteq L_4 \subseteq L_3$

32. Consider the following statements:
(1) Fiber optic cable is much lighter than copper cable.
(2) Fiber optic cable is not affected by power surges or electromagnetic interference.
(3) Optical transmission is inherently bidirectional
Which of the statements is (are) correct?
(a) (1) and (2) only (b) (1) and (3) only
(c) (2) and (3) only (d) (1), (2) and (3)

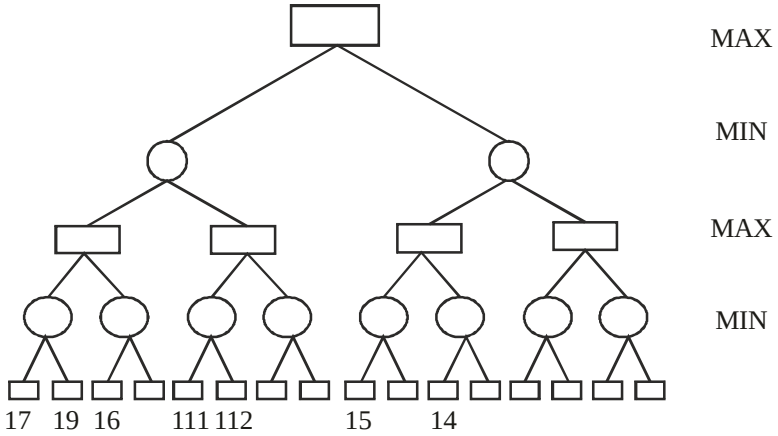
33. Consider the following statements:

S1: If a group $(G,*)$ is of order n, and $a \in G$ is such that $a^m = e$ for some integer $m \le n$, then m, must divide n.

S2: If a group $(G,*)$ is of even order, then there must be an element $a \in G$ such that $a \ne e$ and $a * a = e$.

Which of the statements is (are) correct?
(a) S1 only (b) S2 only (c) Both S1 and S2 (d) Neither S1 nor S2

34. Consider the game tree given below :



Here ▭ and ◯ reresent MIN and MAX nodes respectively, The value of the root node of the game tree is:

(a) 14 (b) 17 (c) 111 (d) 112

35. An _____ chart is a project schedule representation that presents projects plan as a directed graph. The critical path is the _____ sequence of _____ tasks and it defines project _____.

(a) Activity, Shortest, Independent, Cost
(b) Activity, Longest, Dependent, Duration
(c) Activity, Longest, Independent, Duration
(d) Activity, Shortest, Dependent, Duration

36. Consider the following statements:

(1) The running time of dynamic programming algorithm is always $\theta(\rho)$ where ρ is number of subproblems.
(2) When a recurrence relation has cyclic dependency, it is impossible to use that recurrence relation (unmodified) in a correct dynamic program.
(3) For a dynamic programming algorithm, computing all values in a bottom-up fashion is asymptotically faster than using recursion and memorization.
(4) If a problem *X* can be reduced to a known NP-hard problem, then *X* must be NP-hard.

Which of the statement(s) is (are) true?

(a) (1) and (2) only (b) (2) only (c) (2) and (3) only (d) (2) and (4) only

37. Which of the following interprocess communication model is used to exchange messages among cooperative processes?

(a) Shared memory model
(b) Message passing model
(c) Shared memory and message passing model
(d) Queues

38. Let A be the base class in C++ and B be the derived class from A with protected inheritance. Which of the following statement in false for class B?

(a) Member function of class B can access protected data of class A
(b) Member function of class B can access public data of class A
(c) Member function of class B cannot access private data of class A
(d) Object of derived class B can assess public base class data

39. What is the worst case running time of Insert and Extract-min, in an implementation of a priority queue using an unsorted array? Assume that all insertions can be accomodated.

(a) $\theta(1), \theta(n)$ (b) $\theta(n), \theta(1)$ (c) $\theta(1), \theta(1)$ (d) $\theta(n), \theta(n)$

40. Consider the following statements:

S_1: $\forall xP(x) \vee \forall xQ(x)$ and $\forall x(P(x) \vee Q(x))$ are not logically equivalent.

S_2: $\exists xP(x) \wedge \exists xQ(x)$ and $\exists x(P(x) \wedge Q(x))$ are not logically equivalent.

Which of the following statements is/are correct?

(a) S_1 only (b) S_2 only (c) S_1 and S_2 both (d) Neither S_1 nor S_2

41. A fuzzy conjunction operations, $t(x, y,)$, and a fuzzy disjunction operator, $s(x, y)$, from a pair if they satisfy:

$t(x, y) = 1 - s(1-x, 1-y)$.

if $t(x, y) = \dfrac{xy}{(x + y - xy)}$ then $s(x, y)$ is given by

(a) $\dfrac{x+y}{1-xy}$ (b) $\dfrac{x+y-2xy}{1-xy}$ (c) $\dfrac{x+y-xy}{1-xy}$ (d) $\dfrac{x+y-xy}{1+xy}$

42. Which of the following is not needed by an encryption algorithm used in Cryptography?

(a) Key (b) Message (c) Ciphertext (d) User details

43. Match List-I and List-II:

List-I	List-II
(A) Physical layer	(i) Provide token management service
(B) Transport layer	(ii) Concerned with transmitting raw bits over a communication channel
(C) Session layer	(iii) Concerned with the syntax and semantics of the information transmitted
(D) Presentation layer	(iv) True end-to-end layer from source to destination

(a) (A)-(ii), (B)-(iv), (C)-(iii), (D)-(i) (b) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

(c) (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii) (d) (A)-(iv), (B)-(ii), (C)-(i), (D)-(iii)

44. When using Dijkstra's algorithm to find shortest path in a graph, which of the following statement is NOT TRUE ?

(a) It can find shortest path within the same graph data structure

(b) Every time a new node is visited, we choose the node with smallest known distance/ cost (weight) to visit first

(c) Shortest path always passes through least number of vertices

(d) The graph needs to have a non-negative weight on every edge

45. A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughtput of this network?

(a) 1,000,000 bps (b) 2,000,000 bps (c) 12,000,000 bps (d) 1,200,00,000 bps

46. Two concurrent executing transactions T_1 and T_2 are allowed to update same stock item say '*A*' in an uncontrolled manner. In such scenario, following problems may occur:

(1) Dirty read problem (2) Lost update problem

(3) Transaction failure (4) Inconsistent database state

(a) (1), (2) and (3) only (b) (3) and (4) only

(c) (1) and (2) only (d) (1), (2) and (4) only

47. Which of the following binary codes for decimal digits are self complementing?
(1) 8421 code (2) 2421 code (3) excess-3 code (4) excess-3 gray code
(a) (1) and (2) only (b) (2) and (3) only
(c) (3) and (4) only (d) (1) and (4) only

48. Consider $\sum = \{w, x\}$ and $T = \{x, y, z\}$. Define homomorphism h by :

$h(x) = xzy$, $h(w) = zxyy$

If L is the regular language denoted by $r = (w + r^*)(ww)^*$, then the regular language $h(L)$ is given by

(a) $(zxyy + xzy)(zxyy)$ (b) $\left(zxyy + (xzy)^*\right)(zxyyzxyy)^*$

(c) $(zxyy + zxzy)(zxyy)^*$ (d) $\left(zxyy + (xzy)^*\right)(zxyyzxyy)$

49. If we want to resize a 1024 × 768 pixels image to one that is 640 pixels wide with the same aspect ratio, what would be the height of the resized image?
(a) 420 pixels (b) 460 pixels (c) 480 pixels (d) 540 pixels

50. What tag is used to enclose any number of javascript statements in HTML document?
(a) <code> (b) <script> (c) <title> (d) <body>

51. Which of the following CPU scheduling algorithms is/are supported by LINUX operating system?
(a) Non-preemptive scheduling
(b) Preemptive priority scheduling and time sharing CPU scheduling
(c) Time Sharing scheduling only
(d) Priority scheduling only

52. Let $A = \{001, 0011, 11, 101\}$ and $B = \{01, 111, 111, 010\}$.
Similarly, let $C = \{00, 001, 1000\}$ and $D = \{0, 11, 011\}$.
Which have the following pairs have a post-correspondence solution?
(a) Only pair (*A*, *B*) (b) Only pair (*C*, *D*)
(c) Both (*A*, *B*) and (*C*, *D*) (d) Neither (*A*, *B*) nor (*C*, *D*)

53. Consider the following statements with respect to duality in LPP:
(1) The final simplex table giving optimal solution of the primal also contains optimal solution of its dual in itself.
(2) If either the primal or the dual problem has a finite optimal solution, then the other problem also has a finite optimal solution.
(3) If either problem has an unbounded optimum solution. then the other problem has no feasible solution at all.
Which of the statements is (are) correct?
(a) (1) and (2) only (b) (1) and (3) only
(c) (2) and (3) only (d) (1), (2) and (3) only

54. The Data Encryption Standard (DES) has a fucntion consists of four steps. Which of the following is correct order of these four steps?
(a) An expansion permutation, S-boxes, an XOR operation, a straight permutation.
(b) An expansion permutation, an XOR operation, S-boxes, a straight permutation.
(c) An expansion permutation, an S-boxes, an XOR operation, an expansion permutation.
(d) An expansion permutation, an an XOR operation, S-boxes, an expansion permutation.

55. Given two table $R1(x, y)$ and $R2(y, z)$ with 50 and 30 number of tuples respectively. Find maximum number of tuples in the output of natural join between table $R1$ and $R2$ i.e. $R1 * R2 ?(* - \text{Natural Join})$

(a) 30 (b) 20 (c) 50 (d) 1500

56. Given two tables EMPLOYEE (EID, ENAME, DEPTNO)
DEPARTMENT (DEPTNO, DEPTNAME)
Find the most appropriate statement of the given query:

```
Select count (*) 'total'
From EMPLOYEE
where DEPTNO (D1. D2)
group by DEPTNO
having count (*) >5
```

(a) Total number of employees in each department D1 and D2
(b) Total number of employees of department D1 and D2 if their total is >5
(c) Display total number of employees in both departments D1 and D2
(d) The output of the query must have atlest two rows

57. Consider the following statements with respect to network security:
(1) Message confidentiality means that the sender and the receiver expect privacy.
(2) Message integrity means that the data must arrive at the receiver exactly as they were sent.
(3) Message authentication means the receiver is ensured that the message is coming from the intended sender.
Which of the statements is (are) correct?
(a) (1) and (2) only (b) (1) and (3) only (c) (2) and (3) only (d) (1), (2) and (3) only

58. Give asymptotic upper and lower bound for $T(n)$ given below. Assume $T(n)$ is constant for $n \le 2. T(n) = 4T\left(\sqrt{n}\right) + \lg^2 n$

(a) $T(n) = \theta\left(\lg\left(\lg^2 n\right)\lg n\right)$ (b) $T(n) = \theta\left(\lg^2 n \lg n\right)$

(c) $T(n) = \theta\left(\lg^2 n \lg\lg n\right)$ (d) $T(n) = \theta\left(\lg\left(\lg n\right)\lg n\right)$

59.

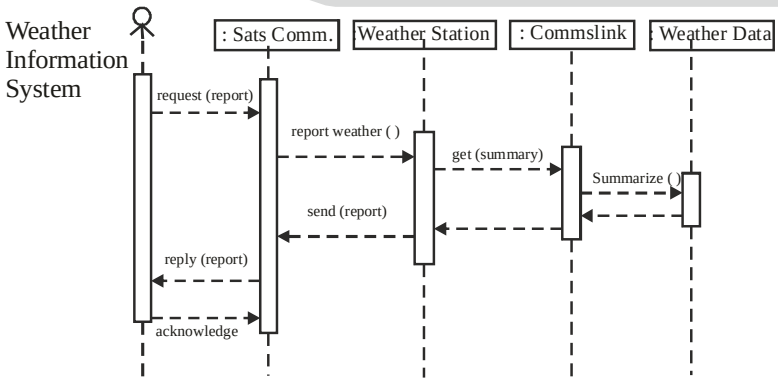


Figure 1

The sequence diagram given in Figure-1 for the Weather Information System takes place when an external system requests the summarized data from the weather station. The increasing order of lifeline for the objects in the system are:
(a) Sat comms → Weather station → Commslink → Weather data
(b) Sat comms → Comms link → Weather station → Weather data
(c) Weather data → Comms link → Weather station → Sat comms
(d) Weather data → Weather station → Common link → Sat comms

60. Given CPU time slice 2ms and following list of processes.

Process	Brust time (ms)	Arrival time
P_1	3	0
P_2	4	2
P_3	5	5

Find average turnaround time and average waiting time using round robin CPU scheduling?
(a) 4, 0 (b) 5.66, 1.66 (c) 5.66, 0 (d) 7, 2

61. A non-pipelined system takes 30ns to process a task. The same task can be processed in a four-segment pipeline with a clock cycle of 10 ns. Determine the speed up of the pipeline for 100 tasks.
(a) 3 (b) 4 (c) 3.91 (d) 2.91

62. The following multithreaded algorithm computer transpose of a matrix in parallel:
p Trans (X,Y,N)
if $N = 1$
then $Y[1,1] \leftarrow X[1,1]$
else partition X into four $(N/2)\times(N/2)$ submatrices $X_{11}, X_{12}, X_{21}, X_{22}$
partition Y into four $(N/2)\times(N/2)$ submatrices $Y_{11}, Y_{12}, Y_{21}, Y_{22}$
spawn p Trans $(X_{11}, Y_{11}, N/12)$
spawn p Trans $(X_{12}, Y_{12}, N/12)$
spawn p Trans $(X_{21}, Y_{21}, N/12)$
spawn p Trans $(X_{22}, Y_{22}, N/12)$
What is the asymptotic parallelism of the algorithm?
(a) T_1/T_∞ or $\theta(N^2/\lg N)$ (b) T_1/T_∞ or $\theta(N^2/\lg N)$
(c) T_1/T_∞ or $\theta(\lg N/N^2)$ (d) T_1/T_∞ or $\theta(\lg N/N)$

63. Conisder the following learning algorithms:
(1) Logistic repression
(2) Back propogation
(3) Linear repression
Which of the following option represents classification algorithms?
(a) (1) and (2) only (b) (1) and (3) only
(c) (2) and (3) only (d) (1), (2) and (3) only

64. Let $G = (V,T,S,P)$ be any context-free grammar without any λ – productions or unit productions. Let K be the maximum number of symbols on the right of any production in P. The maximum number of production rules for any equivalent grammer in Chomsky normal form is given by:
(a) $(K-4|P|+|T|-1)$ (b) $(K-1)|P|+|T|$
(c) $K|P|+|T|-1$ (d) $K|P|+|T|$

65. Accordings to the ISO - 9126 Standard Quality Model, match the attributes given in List-I with their definitions in List-II:

List-I	List-II
(A) Funcionality	(i) Relationship between level of performance and amount of resources
(B) Reliability	(ii) Characteristics related with achievement of purpose
(C) Efficiency	(iii) Effort needed to make for improvement
(D) Maintainability	(iv) Capability of software to maintain performance of software

Choose the correct option from the ones given below :

(a) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)
(b) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)
(c) (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii)
(d) (A)-(i), (B)-(ii), (C)-(iv), (D)-(iii)

66. Match List-I with List-II

List-I	List-II
(A) Micro operation	(i) Specify micro operations
(B) Micro programmed control unit	(ii) Improve CPU utilization
(C) Interrupts	(iii) Control Memory
(D) Micro instruction	(iv) Elementary operation performed on data stored in registers

Choose the correct option from those given below :

(a) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)
(b) (A)-(iv), (B)-(iii), (C)-(i), (D)-(ii)
(c) (A)-(iii), (B)-(iv), (C)-(i), (D)-(ii)
(d) (A)-(iii), (B)-(vi), (C)-(ii), (D)-(i)

67. What are the greatest lower bound (GLB) and the least upper bound (LUB) of the sets $A=\{3,9,12\}$ and $B=\{1,2,4,5,10\}$ if they exist in poset $(z^+,/)$?

(a) $A(GLB-3.LUB-36);B(GLB-1,LUB-20)$

(b) $A(GLB-3.LUB-12);B(GLB-1,LUB-10)$

(c) $A(GLB-1.LUB-36);B(GLB-2,LUB-20)$

(d) $A(GLB-1.LUB-12);B(GLB-2,LUB-10)$

68. Which of the component module of DBMS does rearrangement and possible ordering of operations eleminate redundancy in query and use efficient algorithms and indexes during the execution of a query?

(a) Query compiler
(b) Query optimizer
(c) Stored data manager
(d) Database processor

69. Identify the circumstances under which pre-emptive CPU scheduling is used:

(1) A process switches from Running state to Ready state
(2) A process switches from Waiting state Ready state
(3) A process completes its execution
(4) A process switches from Ready to Waiting state

Choose the correct option:

(a) (1) and (2) only
(b) (1) and (4) only
(c) (3) and (4) only
(d) (1), (2) and (3) only

70. In a system for a restaurant, the main scenario for placing order is given below:
(1) Customer reads menu
(2) Customer places order
(3) Order is sent to kitchen for preparation
(4) Ordered items are served
(5) Customer request for a bill for the order
(6) Bill is prepared for this order
(7) Customer is given the bill
(8) Customer pays the bill
A sequence diagram for the scenario will have atleast how many objects among whome the messages will be exchanged.
(a) 3 (b) 4 (c) 5 (d) 6

71. Consider the following statements:
S1: These exists no algorithm for deciding if any two Turning machines M_1 and M_2 accept the same language.
S2: Let M_1 and M_2 be arbitrary Turning machines. The problem to determine $L(M_1) \subseteq L(M_2)$ is undecidable.
Which of the statements is (are) correct?
(a) S1 Only (b) S2 only (c) Both S1 and S2 (d) Neither S1 nor S2

72. Let $a^{2c} \mod n = (a^c)^2 \mod n$ and $a^{2c+1} \mod n = a \cdot (a^2)^2 \mod n$. For $a = 7.b = 17$ and $n = 561$.
What is the value of $a^b \pmod n$?
(a) 160 (b) 166 (c) 157 (d) 67

73. Suppose a system has 12 magnetic tape drives and at time t_0, three proceses are alloted tape drives out of their need as given below:

	Maximum Nees	Current Allocation
p_0	10	5
p_1	4	2
p_2	9	2

At time t_0, the system is in safe state. Which of the following is safe sequence so that deadlock is avoided?
(a) $\langle p_0, p_1, p_2 \rangle$ (b) $\langle p_1, p_0, p_2 \rangle$ (c) $\langle p_2, p_1, p_0 \rangle$ (d) $\langle p_0, p_2, p_1 \rangle$

74. Given following equation:
$(142)_b + (112)_{b-2} = (75)_8$, find base *b*.
(a) 3 (b) 6 (c) 7 (d) 5

75. Consider a subnet with 720 routers. If a three-level hierarchy is chosen, with eight clusters, each containing 9 regions of 10 routers, then total number of entries in hierarchical table of each router is
(a) 25 (b) 27 (c) 53 (d) 72

76. The following program is stored in the memory unit of the basic computer. Give the content of accumulator register in hexadecimal after the execution of the program:

Location	Instruction
010	CLA
011	ADD 016
012	BUN 014
013	HLT
014	AND 017
015	BUN 013
016	C1A5
017	93C

(a) A1B4 (b) 81B4 (c) A184 (d) 8184

77. The Reduced Instruction Set Computer (RISC) characteristics are:
(1) Single cycle instruction execution
(2) Variable length instruciton formats
(3) Instructions that manipulates operands in memory
(4) Efficient instruction pipeline
Choose the correct characteristics from the options given below:
(a) (1) and (2) (b) (2) and (3) (c) (1) and (4) (d) (3) and (4)

78. Consider the following:
(1) Trapping at local maxima (2) Reaching a plateau (3) Traversal along the ridge
Which of the following option represents shortcomings of hill climbing algorithm?
(a) (1) and (2) only (b) (1) and (3) only
(c) (2) and (3) only (d) (1), (2) and (3)

79. A micro instruction format has microoperation field which is divided into 2 subfields F1 and F2, each having 15 distinct microoperations, condition field CD for four status bits, branch field BR having four options used in conjunction with address field AD. The address space is of 128 memory words. The size of micro instructionis:
(a) 19 (b) 18 (c) 17 (d) 20

80. Consider the following statements with respect to approaches to fill area on rester systems:
P: To determine the overlap intervals for scan lines that cross the area.
Q: To start from a given interior position and paint outward from this point until we encounter the specified boundary conditions.
Select the correct answer from the options given below:
(a) P only (b) Q only (c) Both P and Q (d) Neither P nor Q

81. Which fo the following algorithms is NOT used for line clipping?
(a) Cohen-Sutherland algorithm (b) Southerland-Hodgeman algorithm
(c) Liang-Barsky algorithm (d) Nicholl-Lee-Nicholl algorithm

82. The full from ICANN is
(a) Internet Corporation for Assigned Names and Number
(b) Internet Corporation for Assigned Number and Names
(c) Institute of Cooperation for Assigned Names and Numbers
(d) Internet Connection for Assigned Names and Number

83. Which of the following methods are used to pass any number of parameters to the operating system through system cells?
(a) Registers
(b) Block or table in main memory
(c) Stack
(d) Block in main memory and stack

84. Consider the following statements:
(1) Window Azure is a cloud-operating system.
(2) Google App Engine is an integrated set of online services for consumers to communicate and share with others.
(3) Amzon Cloud Front is a web service for content delivery
Which of the statements is (are) correct?
(a) (1) and (2) only
(b) (1) and (3) only
(c) (2) and (3) only
(d) (1), (2) and (3)

85. Consider the following grammar:

$S \to 0A|0BB$

$A \to 00A|\lambda$

$B \to 1B|11C$

$C \to B$

Which language does this grammar generate?
(a) $L\left((00)^*0+(11)^*1\right)$
(b) $L\left(0(11)^*+1(00)^*\right)$
(c) $L\left((00)^*0\right)$
(d) $L\left(0(11)^*1\right)$

86. An instruction is stored at location 500 with its address field at location 501. The address field has the value 400. A processor register R_1 contains the number 200. Match the addressing mode (List-I) given below with effective address (List-II) for the given instrution:

List-I	List-II
(A) Direct	(i) 200
(B) Register indirect	(ii) 902
(C) Index with R_1 as the index register	(iii) 400
(D) Relative	(iv) 600

Choose the correct option from those given below:
(a) (A)-(iii), (B)-(i), (C)-(iv), (D)-(ii)
(b) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)
(c) (A)-(iv), (B)-(ii), (C)-(iii), (D)-(i)
(d) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

87. A tree has $2n$ vertices of degree 1, $3n$ vertices of degree 2, n vertices of degree 3. Determine the number of vertices and edges in tree.
(a) 12, 11 (b) 11, 12 (c) 10, 11 (d) 9, 10

88. Which of the following statements are true regarding C++?
(1) Overloading gives the capability to an existing operator to operate on other data types
(2) Inheritance in object oriented programming provides support to reusability
(3) When object of a derived class is defined. first the constructor of derived class is executed then constructor of a base class is executed.
(4) Overloading is a type of polymorphism.
Choose the correct option form those given below:
(a) (1) and (2) only
(b) (1), (2) and (3) only
(c) (1), (2) and (4) only
(d) (2), (3) and (4) only

89. A counting semaphore is initialized to 8. 3 wait ( ) operations and 4 signal ( ) operations are applied. Find the current value of semaphore variable.
(a) 9 (b) 5 (c) 1 (d) 4

90. Consider the following languages:

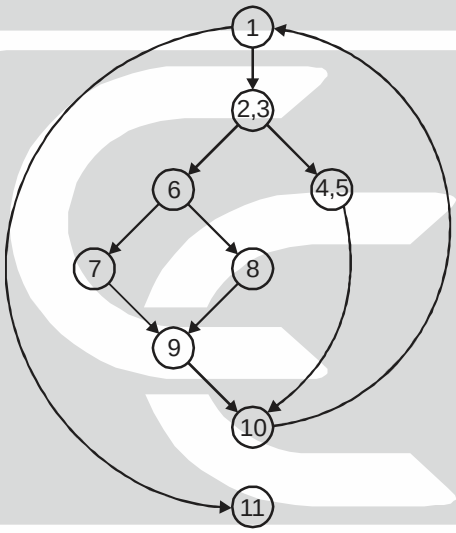
$L_1 = \{a^n b^n c^m\} \cup \{a^n b^m c^m\}, n, m \geq 0$

$L_2 = \{ww^R \mid w \in \{a, b\}^*\}$, where R represents reversible operations.

Which one of the following is (are) inherently ambigous language(s)?
(a) only L_1 (b) only L_2 (c) both L_1 and L_2 (d) neither L_1 nor L_2

Answer the following question (91-95) based on flow graph F.

A flow graph F with entry nod (1) and exit nod (11) is shown below:



Flowgraph F

91. How many regions are there in flowgraph F?
(a) 2 (b) 3 (c) 4 (d) 5

92. How many nodes are there in flowgraph F?
(a) 9 (b) 10 (c) 11 (d) 12

93. How many predicate nodes are there and what are their names?
(a) Three : (1, (2, 3), 6) (b) Three : (1, 4, 6)
(c) Four : ((2, 3), 6, 10, 11) (d) Four : ((2, 3), 6, 9, 10)

94. How many nodes are there in the longest independent path?
(a) 6 (b) 7 (c) 8 (d) 9

95. What is the cyclomatic complexity of flowgraph F?
(a) 2 (b) 3 (c) 4 (d) 5

Answer the following question (96-100) based on the problem statement given below:

An organization needs to maintain database having five attributes *A, B, C, D, E*. These attributes are functionally dependent on each other for which functionally dependency set F is given as : $F : \{A \to BC, D \to E, BC \to D, A \to D\}$. Consider a universal relation $R(A, B, C, D, E)$ with functional dependency set F. Also all attributes are simple and take atomic values only.

96. Identify the normal form in which relation R belong to
(a) 1 NF (b) 2 NF (c) 3 NF (d) $BCNF$

97. Identify the redundant functional dependency in F.
(a) $BC \to D$ (b) $D \to E$ (c) $A \to D$ (d) $A \to BC$

98 Minimal over F' of functional dependency set F is

(a) $F' = \{A \to B, A \to C, BC \to D, D \to E\}$

(b) $F' = \{A \to BC, B \to D, D \to E\}$

(c) $F' = \{A \to B, A \to C, A \to D, D \to E\}$

(d) $F' = \{A \to B, A \to C, B \to D, C \to D, D \to E\}$

99. Identify primary key of table R with functional dependency set F
(a) BC (b) AD (c) A (d) AB

100. Assume that given table R is decomposed in two tables
$R_1(A, B, C)$ with functional dependency set $F_1 = \{A \to B, A \to C\}$ and
$R_2(A, D, E)$ with FD set $F_2 = \{A \to D, D \to E\}$.
Which of the following option is true w.r.t. given decompositions?
(a) Dependency preservation property is followed
(b) R_1 and R_2 are both in $2NF$
(c) R_2 is in $2NF$ and R_3 is in $3NF$
(d) R_1 is in $3NF$ and R_2 is in $2NF$