

Sr. No

[SET-V]
Ph.D. Programme (Odd Semester)
COMPUTER SCIENCE & ENGINEERING

Marks: 100

Time: 2 hours

Roll No.: _____	Date: _____
Time: _____	Centre Name: _____

INSTRUCTIONS FOR THE CANDIDATES	
1.	Please do not open (Break the seal) of the question booklet before time
2.	An OMR answer sheet is being provided separately along with this question booklet. Please fill up all relevant entries like Roll number, Centre code, Paper Number etc. in the spaces provided on the OMR answer sheet and put your signature in the box provided for this purpose.
3.	There are 100 questions in this booklet. Against each question four alternative choices (A), (B), (C) and (D) are given, out of which only one is correct. Indicate your choice of answer by Darkening the suitable circle with Black/Blue Ball Pen in the OMR answer sheet supplied to you separately.
4.	Each question carries one mark. There will be 1/4th negative marking.
5.	Read and follow the instructions given on the backside of the OMR answer sheet carefully.
6.	Do not write your name/Roll number or give any identification mark at any place on the OMR sheet.
7.	Keep all your belongings outside the examination hall. Do not retain any paper except the ADMIT CARD.
8.	Do not talk to each other. Do not borrow anything from other candidates.
9.	Use of CALCULATOR (except programmable calculator) is allowed.
10.	Any body found involved in malpractices, will be disqualified from appearing in the entrance test.
11.	At the start of the examination, please ensure that all pages of your booklet are properly printed; your question booklet is not damaged in any manner and contains 100 questions. In case of any discrepancy, report to the invigilator immediately. No claim in this regard will be entertained at the later stage.

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For Rough Work

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COMPUTER SCIENCE & ENGINEERING

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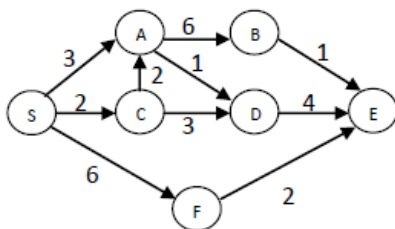
NOTE:

- (i) Attempt all questions. Each question carries one mark. There will be $1/4^{\text{th}}$ negative marking.
- (ii) **There are 100 questions in this booklet.** Against each question four alternative choices (A), (B), (C) and (D) are given, out of which only one is correct. Indicate your choice of answer by Darkening the suitable circle with **Black/Blue Ball Pen** in the OMR answer sheet supplied to you separately.

1. In C programming language, which of the following statements can be used to terminate the current iteration of a loop?

- (A) Break statement
 (B) continue statement
 (C) return statement
 (D) None of these

2. What is the order in which the Dijkstra's algorithm visit the vertices in the following directed graph, starting with vertex S?



- (A) S,A,D,B,C,E,F
 (B) S,C,D,A,B,E,F
 (C) S,C,A,B,E,F,D
 (D) S,C,A,D,F,E,B

3. Given a number of element in the range $[0..n^3]$. Which of the following sorting algorithms can sort them in $O(n)$ time?

- (A) Counting sort
 (B) Bucket sort
 (C) Radix sort
 (D) Quick sort

4. Maximum number of edges in an n-node undirected graph without self-loops is

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

5. What would be the asymptotic time complexity to add an element in a linked list?

- (A) $O(1)$
 (B) $O(n)$
 (C) $O(n^2)$
 (D) None of these

6. The following C function takes a singly-linked list as input arguments. 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_frnt(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;}
  
```

Choose the correct alternative to replace the blank line (=====):

- (A) $q=NULL;$ $p->next=head;$
 $head=p;$
 (B) $q->next=NULL;$ $head=p;$ $p->next=head;$
 (C) $head=p;$ $p->next=q;$ $q->next=NULL;$
 (D) $q->next=NULL;$ $p->next=head;$ $head=p;$

7. How many symbols are used by number system with radix r to represent the numbers present in it?
 (A) N , where $N > r$
 (B) N , where $N < r$
 (C) N , where $N = r$
 (D) N , where N could not be determined from r .
8. Which of the following code is self complementary?
 (A) 8-4-2-1 code
 (B) 2-4-2-1 code
 (C) Gray Code
 (D) BCD Code
9. If in a C program, arr refers to an array of 5 integers. Then, the type of expression arr is
 (A) int*
 (B) int(*)[5]
 (C) int*[5]
 (D) None of these
10. Consider the usual implementation of parentheses balancing program using stack. What is the maximum number of parentheses that will appear on stack at any instance of time during the analysis of () (()) (()) ?
 (A) 1
 (B) 2
 (C) 3
 (D) 4
11. The maximum positive and negative numbers which can be represented in 2's complement form using n bits are respectively
 (A) $2^{n-1}, -2^{n-1}$
 (B) $2^{n-1}, -(2^{n-1} + 1)$
 (C) $(2^{n-1} - 1), -2^{n-1}$
 (D) $(2^{n-1} - 1), -(2^{n-1} - 1)$
12. What is the equivalent Boolean expression in POS form for the following Karnaugh map given below

AB \ CD	00	01	11	10
00		1	1	
01	1			1
11	1			1
10		1	1	

- (A) $\bar{D}B + \bar{B}D$
 (B) $(\bar{D} + B)(\bar{B} + D)$
 (C) $(\bar{D} + \bar{B})(D + B)$
 (D) $(\bar{A} + C)(A + \bar{C})$

13. You want to create a standard access list that denies the subnet of the following host:

172.16.198.94/19.

Which of the following would you start your list with?

- (A) access-list 10 deny 172.16.192.0 0.0.31.255
 (B) access-list 10 deny 172.16.0.0 0.0.255.255
 (C) access-list 10 deny 172.16.172.0 0.0.31.255
 (D) access-list 10 deny 172.16.188.0 0.0.15.255

14. Which command would you place on interface on a private network?

- (A) ip nat inside
 (B) ip nat outside
 (C) ip outside global
 (D) ip inside local

15. In C programming language, qualified constant can be

- (A) Initialized with a value
 (B) Assigned a value
 (C) Both initialized and assigned a value
 (D) Neither initialized nor assigned a value

16. The minimum number of temporary variables required to exchange the content of two variables is

- (A) 0
 (B) 1
 (C) 2
 (D) None of these

17. Which object is constant in the declaration statement int const *ptr; ?

- (A) ptr
 (B) The object pointed to by ptr
 (C) Both ptr and the object pointed to by ptr
 (D) The given declaration is not valid

18. In the declaration statement `int *ptr(int,int);` `ptr` refers to a
- Pointer to a function that accepts two integers and return an integer
 - Pointer to an array of two integers
 - Function that accepts two integers and returns a pointer to an integer
 - None of these
19. If C had dynamic scoping, what would be the output of the following C program?
- ```
void main(){int x=4;first();printf("%d",x);}
int x=3;void first(){printf("%d",x);}
```
- 3 3
  - 3 4
  - 4 3
  - 4 4
20. Consider an implementation of an unsorted doubly linked list. Suppose it has its representation with a head and a tail pointer (i.e., pointers to the first and the last nodes of the linked list). Given the representation which of the following can be implemented in  $O(1)$  time?
- Insertion at the front of the linked list
  - Insertion at the end of the linked list
  - Deletion of the front node of the linked list
  - Deletion of the last node of the linked list
- I and II
  - I and III
  - I, II and III
  - I, II, III, and IV
21. The concatenation of two linked lists is to be performed in  $O(1)$  time. Which of the following variations of the linked lists can be used?
- Singly linked list
  - Doubly linked list
  - Circular doubly linked list
  - Array implementation of list
22. Postfix equivalent of the given infix expression  $1+2*(3+4)/6+4*5$
- $1\ 2\ +\ 3\ 4\ *\ 6\ /\ +\ 4\ *\ 5$
  - $1\ 2\ +\ 3\ 4\ *\ 6\ /\ +\ 4\ 5\ *$
  - $1\ 2\ 3\ 4\ +\ *\ /\ 6\ +\ 4\ 5\ *$
  - $1\ 2\ 3\ 4\ +\ *\ 6\ /\ +\ 4\ 5\ *\ +$
23. The running time of the insertion sort algorithm is given by the recurrence relation
- $T(n) = T(n-1) + O(n)$
  - $T(n) = T(n-1) + O(n^2)$
  - $T(n) = T(n/2) + \theta(n)$
  - $T(n) = 2T(n/2) + O(n)$
24. An array of size `MAX_SIZE` is used to implement a circular queue. `front`, `rear`, and `count` are tracked. Suppose `front` is 0 and `rear` is `MAX_SIZE-1`. How many elements are present in the queue?
- Zero
  - One
  - `MAX_SIZE-1`
  - `MAX_SIZE`
25. There are 3 unlabeled nodes. The root of the tree can contain only 0, 1, or 2 children. The number of trees that can be formed by these 3 nodes such that each node except the root contains zero or one child is
- 1
  - 5
  - 4
  - 3
26. A binary search tree is formed from the sequence 6, 9, 1, 2, 7, 14, 12, 3, 8, 18. The minimum number of nodes required to be added to this tree to form an extended binary tree is
- 3
  - 6
  - 8
  - 11
27. A language with string manipulation facilities uses the following operations:
- `head(s)`: first character of the string  
`tail(s)`: all but the first character of the string  
`concat(s1,s2)`:  $s_1s_2$
- for the string `acbc`, what will be the output of `concat(head(s),head(tail(tail(s))))`
- `ac`
  - `bc`
  - `ab`
  - `cc`

28. The average number of key comparisons done on a successful sequential search in list of length  $n$  is
- (A)  $\log n$   
 (B)  $(n-1)/2$   
 (C)  $n/2$   
 (D)  $(n+1)/2$
29. A program P reads in 500 integers in the range (0,100) representing the scores of 500 children. It then prints the frequency of each score above 50. What would be the best way for P to store the frequencies?
- (A) An array of 50 numbers  
 (B) An array of 100 numbers  
 (C) An array of 500 numbers  
 (D) A dynamically allocated array of 550 numbers
30. In binary search, the problem having  $n$  elements is divided into two parts and the time complexity of the solution is given by  $O(\log_2 n)$ . In ternary search, the problem is divided into three parts and the time complexity of the solution is given by  $O(\log_3 n)$ . Similarly, if we keep on increasing the number of partitions, and divide the problem into  $n$  parts, the time complexity of solution would be
- (A)  $O(\log_n n) = O(1)$   
 (B)  $O(\log_2 n)$   
 (C)  $O(n)$   
 (D)  $O(n \log n)$
31. An undirected graph G has  $|V|$  vertices and  $|E|$  edges and is represented by adjacency list. What is the time required to generate all the connected components?
- (A)  $O(|V|)$   
 (B)  $O(|E|)$   
 (C)  $O(|V| + |E|)$   
 (D)  $O(|E|^2)$
32. Given a hash table with  $n$  keys and  $m$  slots, with the simple uniform hashing assumption : the collisions are avoided using chaining. What is the probability that first slot ends up empty?
- (A)  $(m-1/m)^n$   
 (B)  $m-1/m$   
 (C)  $1/m$   
 (D) None of these
33. The worst case time complexity of the quick sort algorithm is given by the recurrence relation
- (A)  $T(n) = T(n/2) + O(1)$   
 (B)  $T(n) = T(n/2) + O(n)$   
 (C)  $T(n) = T(n-1) + O(1)$   
 (D)  $T(n) = T(n-1) + O(1)$
34. The time complexity to sort elements of binary search tree is
- (A)  $O(n^2)$   
 (B)  $O(n)$   
 (C)  $O(n \log n)$   
 (D)  $O(n^2 \log n)$
35. Which of the following problems is not NP-hard?
- (A) Hamiltonian circuit problem  
 (B) The 0/1 knapsack problem  
 (C) Finding bi-connected components of the graph  
 (D) The graph coloring problem
36. In a heap with  $n$  elements with the smallest element at the root, the seventh smallest element can be found in time
- (A)  $\Theta(n \log n)$   
 (B)  $\Theta(n)$   
 (C)  $\Theta(\log n)$   
 (D)  $\Theta(1)$
37. Consider the following functions :
- $$f(n) = 2^n$$
- $$g(n) = n!$$
- $$h(n) = n^{\log n}$$
- Which of the following statements about the asymptotic behavior of  $f(n)$ ,  $g(n)$ , and  $h(n)$  is TRUE?
- (A)  $f(n) = O(g(n)); g(n) = O(h(n))$   
 (B)  $f(n) = \Omega(g(n)); g(n) = O(h(n))$   
 (C)  $g(n) = O(f(n)); h(n) = O(f(n))$   
 (D)  $h(n) = O(f(n)); g(n) = \Omega(f(n))$
38. What does RIPv2 use to prevent routing loops?
- (A) CIDR  
 (B) Split horizon  
 (C) Authentication  
 (D) Classless masking

39. Two connected routers are configured with RIP routing. What will be the result when a router receives a routing update that contains a higher-cost path to a network already in its routing table?
- (A) The updated information will be added to the existing routing table.  
 (B) The updated information will replace the existing routing table entry.  
 (C) The existing routing table entry will be deleted from the routing table and all routers will exchange routing updates to reach convergence.  
 (D) The update will be ignored and no further action will occur.
40. If a switch receives a frame and the source MAC address is not in the MAC address table but the destination address is, what will the switch do with the frame?
- (A) Discard it and send an error message back to the originating host  
 (B) Flood the network with the frame  
 (C) Add the source address and port to the MAC address table and forward the frame out the destination port  
 (D) Add the destination to the MAC address table and then forward the frame
41. A switch has been configured for three different VLANs: VLAN2, VLAN3, and VLAN4. A router has been added to provide communication between the VLANs. What type of interface is necessary on the router if only one connection is to be made between the router and the switch?
- (A) 10Mbps Ethernet  
 (B) 56Kbps Serial  
 (C) 100Mbps Ethernet  
 (D) 1Gbps Ethernet
42. The relationship between  $\Sigma^*$  and  $\Sigma^+$  is
- (A)  $\Sigma^* = \Sigma^+ \cup \epsilon$   
 (B)  $\Sigma^+ = \Sigma^* \cup \epsilon$   
 (C)  $\Sigma^* = \Sigma^+$   
 (D)  $\Sigma^+ = \Sigma^* \cap \epsilon$
43. Which of the following regular expression is equivalent to the regular expression  $(00 + 0 + 1)^*$ ?
- (A)  $(00 + 1)^*$   
 (B)  $(0 + 1)^*$   
 (C)  $(00 + 0 + 1)$   
 (D)  $(00 + 1)$
44. Which of the following is not a regular language over  $\Sigma = \{a, b\}$ ?
- (A) Set of all the strings containing  $aaa$  as substring  
 (B) Set of all the strings beginning with  $aa$  and ending with  $bb$   
 (C) Set of all the strings containing any number of repetitions of  $aa$   
 (D) Set of all the strings of type  $w=xx$ , where  $x$  is any string over  $\{a, b\}$
45. Which of the following language is regular?
- (A)  $L = \{0^n 1^n | n > 0\}$   
 (B)  $L = \{0^{2n} | n > 0\}$   
 (C)  $L = \{0^{n^2} | n > 0\}$   
 (D)  $L = \{0^n | n \text{ is prime}\}$
46. Given a Turing machine
- $$M = (\{q_0, q_1, q_f\}, \{0, 1\}, (0, 1, B), \delta, B\{q_f\}),$$
- where  $\delta$  is transition function defined as
- $$\begin{aligned} \delta(q_0, 0) &\vdash (q_1, B, R) \\ \delta(q_1, 1) &\vdash (q_0, B, R) \\ \delta(q_0, B) &\vdash (q_f, B, R) \end{aligned}$$
- The language  $L(M)$  accepted by the Turing machine is given as
- (A)  $0^*1^*$   
 (B)  $1^*0^*$   
 (C)  $(01)^*$   
 (D)  $(10)^*$
47. If  $G$  is context free grammar and  $w$  is a string of length  $n$  in  $L(G)$ , how long is the derivations of  $w$  in  $G$ , if  $G$  is in Chomsky normal form?
- (A)  $n$   
 (B)  $2n$   
 (C)  $2n+1$   
 (D)  $2n-1$
48. A shift-reduce parser carries out the actions specified by the translation schemes
- $$\begin{aligned} S &\rightarrow xxW\{\text{print}''1''\} \\ S &\rightarrow y\{\text{print}''2''\} \\ W &\rightarrow Sz\{\text{print}''3''\} \end{aligned}$$
- What is the translation of  $xxxxyyzz$  using the syntax-directed translation scheme described by the earlier rules?

- (A) 11233  
 (B) 11231  
 (C) 23131  
 (D) 33211

49. The expression grammar  $E \rightarrow E + E | E * E | id$  is

- (A) Ambiguous  
 (B) Unambiguous  
 (C) One in which an ambiguity depends on a given sentence  
 (D) None of these

50. Machine-independent code optimization can be applied to

- (A) Source code  
 (B) Object code  
 (C) Intermediate representation  
 (D) None of these

51. Given the following expression grammar

$$E \rightarrow E * F | F + E | F$$

$$F \rightarrow F - F | id$$

Which of the following is true?

- (A)  $-$  has higher precedence than  $*$   
 (B)  $+$  and  $-$  have higher precedence  
 (C)  $+$  has higher precedence than  $*$   
 (D)  $*$  has higher precedence than  $+$

52. Let us assume that the SLR parser for a grammar  $G$  has  $n_1$  states and the LALR parser for  $G$  has  $n_2$  states. The relationship between  $n_1$  and  $n_2$  is

- (A)  $n_1$  is necessarily less than  $n_2$   
 (B)  $n_1$  is necessarily equal to  $n_2$   
 (C)  $n_1$  is necessarily greater than  $n_2$   
 (D) None of these

53. From swapped block state, the process can come to which of the following state?

- (A) Ready state  
 (B) Running state  
 (C) Blocked state  
 (D) Held state

54. Consider all processes arrive at the same time. Process with higher priority is executed first. Let priority be determined on the basis of waiting time. This is equivalent to

- (A) Round robin scheduling  
 (B) FCFS scheduling  
 (C) SJF scheduling  
 (D) None of the above

55. What is the average turnaround time if the following processes are scheduled using SJF(with preemption) scheduling?

| Process | Arrival time | Processing time (ms) | Priority |
|---------|--------------|----------------------|----------|
| A       | 0            | 8                    | 5        |
| B       | 0            | 6                    | 3        |
| C       | 3            | 3                    | 1        |
| D       | 6            | 15                   | 4        |
| E       | 12           | 3                    | 2        |

- (A) 12.8 ms  
 (B) 13.2 ms  
 (C) 14.2 ms  
 (D) 17 ms

56. A process enters the system with priority P1. In the ready queue, its priority changes at the rate P2 and in the running state its priority changes at rate P3. What will be the nature of scheduling if  $P1 > P2 = P3$ ?

- (A) First come first serve  
 (B) Last in first out  
 (C) Shortest job first  
 (D) Round robin

57. In RR scheduling, let time quantum be T ms and on average process runs for P ms before going for I/O. if it takes S ms for switching, then what is the efficiency of the CPU?

- (A) 100%  
 (B) 75%  
 (C) 50%  
 (D) 25%

58. For sleeping barber problem, how many semaphores are required?

- (A) 1  
 (B) 2  
 (C) 3  
 (D) 4

59. Which of the following language over  $\{a,b,c\}$  is accepted by deterministic push down automaton?

- (A)  $\{wbw^R | w \in \{a,c\}^*\}$   
 (B)  $\{ww^R | w \in \{a,b,c\}^*\}$   
 (C)  $\{a^n b^n c^n | n \geq 0\}$   
 (D)  $\{w | w \text{ is palindrome over } \{a,b,c\}\}$



60. Let  $L$  denote the language generated by the grammar  $S \rightarrow OSO|00$ . Which of the following is TRUE?
- (A)  $L=0^+$   
 (B)  $L$  is a regular but not  $0^+$   
 (C)  $L$  is context free but not regular  
 (D)  $L$  is not context free
61. The smallest finite automaton which accepts the language  $\{x | \text{length of } x \text{ is divisible by } 3\}$  has
- (A) 5 states  
 (B) 4 states  
 (C) 3 states  
 (D) 2 states
62. Let  $N_f$  and  $N_p$  denote two classes of languages accepted by non-deterministic finite automata and non-deterministic pushdown automaton, respectively. Let  $D_f$  and  $D_p$  denote the classes of languages accepted by deterministic finite automata and deterministic pushdown automata, respectively. Which one of the following is TRUE?
- (A)  $D_f \subset N_f$  and  $D_p \subset N_p$   
 (B)  $D_f \subset N_f$  and  $D_p = N_p$   
 (C)  $D_f = N_f$  and  $D_p = N_p$   
 (D)  $D_f = N_f$  and  $D_p \subset N_p$
63. Which of the following represent the relationship of a single subclass entity set with a relation that involves more than one distinct super class?
- (A) Categorization  
 (B) Aggregation  
 (C) Composition  
 (D) Generalization
64. For a relation  $R$ , let  $A$  represent the primary key attribute set,  $B$  represent the candidate key set, and  $C$  represent the super key set. Which of the following is correct?
- (A)  $C \subseteq A \subseteq B$   
 (B)  $C \subseteq B \subseteq A$   
 (C)  $B \subseteq A \subseteq C$   
 (D)  $A \subseteq B \subseteq C$
65. Which of the following relational algebra equates fast?
- (A)  $\sigma_{P \wedge Q}(R \times S)$   
 (B)  $\sigma_P(R) \times \sigma_Q(S)$   
 (C)  $\sigma_Q((\sigma_P(R) \times S))$   
 (D)  $\sigma_P(R \times (\sigma_Q S))$
66. If one transaction has 6 instructions and another has 4 instructions, then the number of serial transaction schedules that can be generated is
- (A) 2  
 (B) 10  
 (C) 24  
 (D) 210
67. The order of a leaf node in a  $B^+$  tree is maximum number of (value, data record pointer) pairs it can hold. Given that block size is 1K bytes, the data record pointer is 5 bytes long, the value of the field is 7 bytes long, and a block pointer is 4 bytes long, what is the order of the leaf node?
- (A) 64  
 (B) 69  
 (C) 75  
 (D) 85
68. Consider a project is estimated to be 500 KLOC. The effort and development time for semidetached mode are
- (A) 1637 PM, 41.61 months  
 (B) 3162 PM, 41.96 months  
 (C) 4358 PM, 42.63 months  
 (D) 6238 PM, 40.95 months
69. If the total number of nodes in graph are 16 and decision nodes are 9. The number of independent paths and number of test cases should be there to cover all the paths are:
- (A) 10, 10  
 (B) 24, 10  
 (C) 9, 16  
 (D) 16, 24
70. If the time taken to develop a project is reduced to one third, then effort has to be increased by
- (A) 3  
 (B) 9 times  
 (C) 27 times  
 (D) 81 times

71. A company needs to develop software for machine learning. The software is expected to have 50000 lines of code. The company needs to determine the effort in person months needed to develop this software using COCOMO basic model. The multiplicative factor for this model is 2.6 while the exponentiation factor is given as 1.26. The estimated effort in person-months is then found to be:

- (A) 234.25
- (B) 359.48
- (C) 511.19
- (D) 932.54

72. A variable can have value in the range 0-100. Which of the following is a good test case as per equivalence class testing?

- (A) {0, 100, 125}
- (B) {-3, 0, 100}
- (C) {-10, 23, 125}
- (D) {-23, 23, 97}

73. A software project has four phases P1, P2, P3 and P4. P1 is the first phase and needs to be completed before any other phase. Phase P2 and P3 can be executed in parallel. Phase P4 cannot commence until phase both P2 and P3 are completed. The most likely, optimistic and pessimistic estimate of phase completion time in days for P1, P2, P3 and P4 are respectively, (15, 11, 25), (8, 7, 15), (9, 8, 22) and (8, 3, 19). The critical path of this project and slack of P2 are respectively:

- (A) P1-P2-P4, 1 day
- (B) P1-P3-P4, 1 day
- (C) P1-P2-P4, 2 days
- (D) P1-P3-P4, 2 days

74. The following program prints

```
main()
{ p (); p (); p (); }
p ()
{ static int i ;
printf("%d", ++i); }
```

- (A) 0 1 2
- (B) 3 consecutive, but unpredictable numbers
- (C) 1 2 3
- (D) 1 1 1

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

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

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
- (B) 8
- (C) 9
- (D) 10

76. Suppose the letters a, b, c, d, e, f have probabilities  $1/2, 1/4, 1/8, 1/16, 1/32, 1/32$  respectively. Which of the following in the Huffman code for the letters a, b, c, d, e, f?

- (A) 0, 10, 110, 1110 11110, 11111
- (B) 11, 10, 011, 010, 001, 000
- (C) 11, 10, 01, 001, 0001, 0000
- (D) 110, 100, 010, 000, 001, 111

77. In a compiler, keywords of language are recognized during:

- (A) data flow analysis
- (B) parsing of the program
- (C) the lexical analysis of the program
- (D) the code generation

78. Assume the exponent  $e$  is the constrained to lie on the range  $0 \leq e \leq x$ , with a bias  $q$ , that the base is  $b$  and that the significant is  $P$ -digits in length. What is the largest positive value that can be is normalized floating point?

- (A)  $b^{x-q}(1 - b^{-p})$
- (B)  $b^{-q-1}$
- (C)  $b^{-q-p}$
- (D)  $b^{x-q}(b^{-p} - 1)$

79. A non-pipelined system takes 50 ns to process a task; the same task can be processed in a six-segment pipeline with a clock cycle of 10 ns. Speedup ratio of 100 tasks for pipeline is

- (A) 4.37
- (B) 4.76
- (C) 5.17
- (D) 5.48

80. The main memory of a computer has  $2ab$  blocks while the cache has  $2a$  blocks. If the cache uses the set associative mapping scheme with two blocks per set, then the block  $k$  of main memory maps to the set:
- (A)  $(k \bmod 2a)$  of cache  
 (B)  $(k \bmod 2ab)$  of cache  
 (C)  $k \bmod b$  of cache  
 (D)  $(k \bmod a)$  of cache
81. There are 10 lamps in a hall. Each one of them can be switched on independently. The number of ways in which hall can be illuminated is
- (A)  $10^2$   
 (B) 1023  
 (C)  $2^{10}$   
 (D) 10!
82. What is (?) in the following table?
- |    |    |    |
|----|----|----|
| 8  | 54 | 27 |
| 9  | 71 | ?  |
| 10 | 90 | 45 |
- (A) 39  
 (B) 37  
 (C) 35.5  
 (D) 34.5
83. If 'THIS MAN IS GOOD' is coded as 153. What will be the code for 'THAT MAN IS NOT GOOD'?
- (A) 200  
 (B) 195  
 (C) 190  
 (D) 180
84. A earned Rs 84000. One third of it went to taxes. The rest was invested and appreciated by one half. Two third of that went into business. Additional tax was paid equal to  $\frac{2}{3}$  of the remaining amount. How much money was left with A?
- (A) 8790  
 (B) 8777  
 (C) 9000  
 (D) 9333
85. If Aneesh is paternal first cousin of Rahul, how is their father's mother is related to them?
- (A) Mother  
 (B) Grandmother  
 (C) Paternal aunt  
 (D) Maternal aunt
86. I got my first job on May 22, 1983. Which day of the week it was?
- (A) Monday  
 (B) Tuesday  
 (C) Friday  
 (D) Sunday
87. A petrol dealer adds 20% kerosene oil to petrol. If purchase price of petrol is Rs. 60 per litre and that of kerosene is Rs. 20 per litre, and sale price of the petrol is Rs. 61 per litre, what is his percentage profit?
- (A) 14.25  
 (B) 14.37  
 (C) 14.50  
 (D) 14.70
88. Anant parked his motorcycle at 9<sup>th</sup> place from the left and 28<sup>th</sup> from the right. How many motorcycles are parked in the row?
- (A) 37  
 (B) 36  
 (C) 35  
 (D) 34
89. In an imaginary language digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 are substituted by t, d, j, o, r, m, u, x, b and z. 10 is written as dt and so on. Use the above information and find the value of expression given below:
- $$\{(or - dj) \times u\} \div dj$$
- (A) 9  
 (B) 10  
 (C) 11  
 (D) 12
90. Seven friends meet at their college reunion, shake hand with each other once. How many hand shake will be there altogether?
- (A) 21  
 (B) 42  
 (C) 27  
 (D) 49
91. Ms Anandita starts at left and moves 8 Kms. She then turns right and moves 4 Kms. Then she turns right again for 8 Kms. How far is she from the initial position?
- (A) 20 Kms  
 (B) 10 Kms  
 (C) 08 Kms  
 (D) 04 Kms

92. Lunch-dinner pattern of a person for 'm' days is given below. He has a choice of VEG or NON-VEG meal for his lunch/dinner.

- (i) If he takes a NON-VEG lunch, he will have only VEG dinner
- (ii) He takes NON-VEG dinner for 9 days
- (iii) He takes VEG lunch for 11 days
- (iv) He takes a total of 14 NON-VEG meals

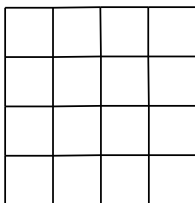
What is 'm'?

- (A) 18
- (B) 20
- (C) 24
- (D) 38

93. 20% students of a particular course get jobs within one year of passing. 20% of the remaining students get jobs by end of the second year of passing. If 16 students are still jobless, how many students had passed the course?

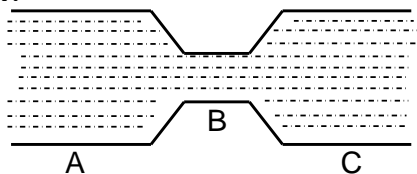
- (A) 25
- (B) 50
- (C) 62
- (D) 84

94. How many rectangles (which are not squares) in the following figure?



- (A) 56
- (B) 70
- (C) 80
- (D) 96

95. Water is flowing through a tube as shown below:



The cross-sectional area of A and C are equal and greater than the cross-sectional area of B. If the flow of water is steady, than the pressure on the walls at B is

- (A) less than that at A and that at C
- (B) more than that at A and that at C
- (C) same as that at A and that at C

(D) more than that at A but less than that at C

96 Processor IC chip was developed by?

- (A) AMD
- (B) Intel
- (C) DIX
- (D) Both (A) and (B)

97 If  $5472 = 9$ ,  $6342 = 6$ ,  $7584 = 6$ . What is 9236?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

98 Chipko movement was started by?

- (A) Arundhati Roy
- (B) Medha Patkar
- (C) Ila Bhatt
- (D) Sunder lal Bahuguna

99 What is the following is not a natural hazard?

- (A) Earthquake
- (B) Tsunami
- (C) Flash floods
- (D) Nuclear accident

100 Which of the following team won the 9<sup>th</sup> IPL cricket T-20 tournament?

- (A) Kolkata Knight Riders
- (B) Sun Risers Hyderabad
- (C) Mumbai Indians
- (D) Royal Challengers Bangalore