

PROVISIONAL ANSWER KEY

NAME OF THE POST:

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Note:

- 1). All Suggestions are to be sent with reference to website published Question paper with Provisional Answer Key Only.
- 2). All Suggestions are to be sent in the given format only.
- 3). Candidate must ensure the above complinace

101. If Power set of A has 256 elements, how many elements are there in A?
 (A) 16 (B) 08
 (C) 04 (D) 32
102. Insert the following nodes in an empty Binary Max-heap in the order. 3, 2, 1, 4, 5, 8, 7. The level order traversal of the binary max heap obtained above is
 (A) 8, 4, 7, 2, 3, 1, 5 (B) 8, 7, 5, 4, 3, 2, 1
 (C) 8, 5, 7, 4, 2, 1, 3 (D) 8, 5, 7, 4, 2, 3, 1
103. Which of the following has compilation error in C?
 (A) `int n = 17;` (B) `char c = 99;`
 (C) `float f = (float) 99. 32;` (D) `#include<stdio. h>`
104. Suppose a hash function f is defined as $f(\text{key}) = \text{key} \bmod 7$. With linear probing, if the keys 37, 38, 72, 48, 98, 11, 56 are inserted into a table indexed from 0 then find the location where in the key 11 is stored?
 (A) 3 (B) 4
 (C) 5 (D) 6
105. Consider the following recurrence relation:

$$T(n) = 2T(\sqrt{n}) + 1$$

$$T(1) = 1$$
 Which of the following is true?
 (A) $T(n) = O(\log \log n)$ (B) $T(n) = O(\log n)$
 (C) $T(n) = O(\sqrt{n})$ (D) $T(n) = O(n)$
106. How many times the body of the following for loop will be executed?
`for (putchar('a') ; putchar (0) ; putchar('c'))`
`{putchar ('b');}`
 (A) 0 time
 (B) 1 time
 (C) Infinitely many times
 (D) Will not be executed because of syntax error
107. Consider the elements 21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7 in construction of AVL tree. Then number of RL imbalances occur during its construction.
 (A) 1 (B) 2
 (C) 3 (D) 4

108. The number of comparisons needed in the worst case for given two sorted lists of size 'm' and 'n' using merge sort method is _____
- (A) $m \times n$
 (B) maximum of m, n
 (C) minimum of m, n
 (D) $m + n - 1$
109. Stack is useful for implementing
- (A) radix sort
 (B) Recursion
 (C) Breadth First search
 (D) both B and C
110. Which of the following algorithm design technique is used in the quick sort algorithm?
- (A) Dynamic Programming
 (B) Backtracking
 (C) Divide and Conquer
 (D) Greedy method
111. What can be the contents of stack from bottom to top, at one of the time instants while evaluating a postfix expression: $5\ 8\ 4\ /\ +\ 3\ 2\ * -$ (assume that numbers are of 1 digit size) ?
- (A) 7, 6
 (B) 7, 5
 (C) 6, 6
 (D) 7, 1
112. The order of precedence of the set of operators $\{+, -, *, /, \$\}$ from highest to lowest is $\$, * \text{ or } /, + \text{ or } -$. If infix expression is $A\$B*C-D+E/F/(G+H)$, then find its equivalent post fix expression (All the operators are left associative except $\$$)
- (A) $AB\$C*D-EF/GF+/-$
 (B) $AB\$C*D+EF/GF+/-$
 (C) $AB\$C*EF/GF+/-D-$
 (D) $ABC*\$D-EF/GH+/-$
113. Consider the program segment given below :
- ```

swap(int x, int y)
{
 x=x+y;
 y=x-y;
 x=x-y;
}

```
- What is the result for the call  $\text{swap}(a[i], a[i])$ , using call-by-value result ?
- (A) There is no change in the value of  $a[i]$   
 (B) it doubles the value of  $a[i]$   
 (C) it halves the value of  $a[i]$  from its original value  
 (D) none of these

114. Suppose each of push and pop operations on stack takes 1 unit of time and insert and delete operations on queue take 2 units of time each. Assuming  $n$  elements are in a stack, find the minimum time to reverse the elements in a stack using queue.

(A)  $4n$  units

**(B)**  $6n$  units

(C)  $8n$  units

(D)  $9n$  units

115. Let  $T$  be a  $K$ -ary rooted tree such that every internal node of  $T$  has exactly  $k$  children. If number of leaf nodes in  $T$  is  $2(n - 1) + 3$  where  $n$  is the number of internal nodes, then which of the following is true ?

(A)  $k=2$

**(B)**  $k=3$

(C)  $k=4$

(D) None of these

116. What is the best case and worst case time complexity of the following function?

Fun( $n$ )

{

If  $n==0$  return 1 ;

If  $(n \bmod 2) == 1$

Return  $(2 * \text{Fun}(\lfloor n/2 \rfloor))$ ;

return  $(n+1)$

}

(A)  $\theta(1)$  and  $\theta(n)$

**(B)**  $\theta(1)$  and  $\theta(\log_2 n)$

(C)  $\theta(\log_2 n)$  and  $\theta(\log_2 n)$

(D)  $\theta(n)$  and  $\theta(n)$

117. Number of rooted binary trees of height  $n$  with exactly one leaf is

(A)  $n$

(B)  $n + 1$

**(C)**  $2^n$

(D)  $\frac{2^n C_n}{n+1}$

118. Consider  $g_1(n)$  and  $g_2(n)$  defined as follows

$$g_1(n) = n^3 \text{ for } 0 \leq n \leq 10^6 \\ = n^2 \text{ for } n \geq 10^6$$

$$g_2(n) = n \text{ for } 0 \leq n \leq 10 \\ = n^3 \text{ for } n > 10$$

Which of the following is true?

- (A)  $g_1(n) = O(g_2(n))$  (B)  $g_2(n) = O(g_1(n))$   
(C) both (A) and (B) (D) None of these

119. The number of rotations needed to insert the sequence of elements 15, 14, 9, 18 into an empty AVL Tree

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

120. Suppose we have numbers between 1 and 1000 in a binary search tree and we are searching for 360. Which of the following sequence could not be sequence of nodes examined?

- (A) 2, 252, 401, 398, 330, 344, 350, 360  
(B) 924, 220, 911, 244, 898, 258, 362, 360  
(C) 925, 202, 911, 240, 950, 245, 360  
(D) 2, 399, 387, 219, 266, 382, 381, 278, 360

121. Which of the following statements is/are true?

I. As the number of collisions increases, the lookup time increases.

II. The worst case complexity of quick sort is  $O(n^2)$

- (A) I only (B) II only  
(C) both I and II (D) Neither I or II

122. Which of the following problems is/are NP complete?

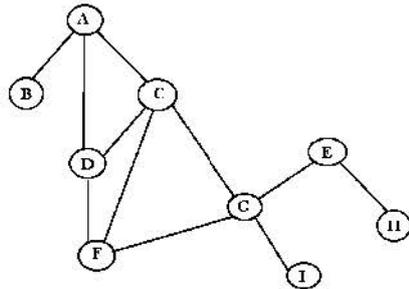
- (A) Determine if a graph can be coloured with 4 colours  
(B) Determine if a graph can be coloured with 3 colours  
(C) Determine if a graph can be coloured with 2 colours  
(D) Both (A) and (B)

123. In the standard merge sort algorithm on a list of size  $n$ , what is the maximum number of times an item can be compared?

- (A) 2 (B)  $\log n$   
(C)  $n-1$  (D)  $n \log n$

124. Consider the following graph having traversing sequence on Graph given below:

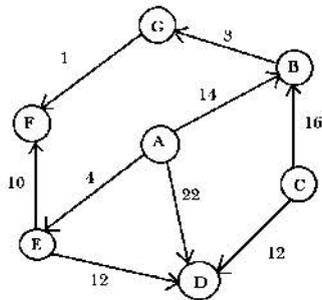
- (i) A, B, D, C, F, G, I, E, H
- (ii) A, B, C, D, G, F, I, E, G



Which if the following is TRUE ?

- (A) (i) represents the BFS sequence and (ii) represent DFS sequence
- (B) (i) represents the DFS sequence and (ii) represent BFS sequence
- (C) (i) and (ii) represent BFS sequence
- (D) Both (B) and (C)**

125. If we run Dijkstra's single source shortest path algorithm on the graph below with A as the source vertex, then the set of edges in the shortest path tree is



- (A) {(A, E), (A, B), (E, F), (E, D), (B, G)}**
- (B) {(A, E), (A, B), (A, D), (E, F), (B, G)}
- (C) {(A, E), (A, B), (A, D), (E, F), (B, G), (C, D)}
- (D) {(A, E), (A, B), (E, F), (E, D), (B, G), (C, D)}

126. Consider the Huffman codes that are used to compress the data. Four messages with their respective frequencies are given in the table.

|           |      |      |      |      |
|-----------|------|------|------|------|
| Message   | M1   | M2   | M3   | M4   |
| Frequency | 0.51 | 0.25 | 0.13 | 0.11 |

What will be the sequence of messages for binary sequence 10101001001000010011 (with the convention that the left branch is labelled 0 and right branch is labelled 1 of the decode tree) ?

- (A) M1 M2 M4 M1 M2 M3 M4 M1 M1  
 (B) M1 M2 M4 M2 M2 M3 M1 M4 M1  
 (C) M1 M1 M4 M3 M2 M3 M1 M4 M1  
 (D) M1 M1 M2 M3 M3 M4 M2 M3 M1
127. We are given 10 tasks. The execution of task requires 1 unit of time. Each task  $T[i]$  has profit  $p[i]$  and deadline  $d[i]$ . Profit  $p[i]$  is earned if task  $T[i]$  is completed before  $d[i]$ <sup>th</sup> unit of time.

|          |      |      |      |      |      |      |      |      |      |       |
|----------|------|------|------|------|------|------|------|------|------|-------|
| I        | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10    |
| Task     | T[1] | T[2] | T[3] | T[4] | T[5] | T[6] | T[7] | T[8] | T[9] | T[10] |
| Profit   | 15   | 22   | x    | 18   | 25   | 12   | 24   | 18   | 20   | 15    |
| Deadline | 1    | 2    | 2    | 3    | 4    | 5    | 3    | 6    | 1    | 5     |

Suppose maximum total profit earned by scheduling above task is 129, then profit 'x' of  $T[3]$  is

- (A) 27 (B) 23  
 (C) 24 (D) 25
128. Consider the Huffman codes that are used to compress the data. Four messages with their respective frequencies are given in the table.

|           |      |      |      |      |
|-----------|------|------|------|------|
| Message   | M1   | M2   | M3   | M4   |
| Frequency | 0.51 | 0.25 | 0.13 | 0.11 |

The average length of the code word is

- (A) 1.73 (B) 2.21  
 (C) 2.25 (D) 3
129. The running time of any comparison - based algorithm for sorting an n-element sequence in the worst case is
- (A)  $\Omega(n \log n)$  (B)  $\Omega(n^2)$   
 (C)  $\Omega(n^{1.5})$  (D)  $O(n \log n)$





138. The pre-order and in-order traversals of a binary tree of nodes A to I are A B D G C E H I F and D G B A H E I C F respectively. Its post-order traversal is  
 (A) E D G B H F I C A (B) C D G H F E I B A  
 (C) G D B H I E F C A (D) G D B H E F I C A
139. AND/OR graphs are  
 (A) Components used for drawing Entity-Relationship diagrams  
 (B) Diagrams representing the AND gates and OR gates  
 (C) Graph like structures used for representing the solution of a problem  
 (D) Computer programs for drawing graphs
140. Binary search requires that all elements must be  
 (A) In sorted order (B) Positive integers  
 (C) Records (D) Structures
141. The knapsack problem where the objective function is to minimize the profit is an example of  
 (A) Greedy technique  
 (B) Dynamic Programming technique  
 (C) Branch and bound technique  
 (D) Backtracking technique
142. The chromatic number of a tree with  $n$  vertices is  
 (A) 2 (B) 4  
 (C)  $n$  (D)  $n/2$
143. For problems X and Y, Y is NP-Complete and reduces to X in polynomial time. Which of the following is TRUE?  
 (A) If X can be solved in polynomial time, then so can Y  
 (B) X is NP-Complete  
 (C) X is NP-hard  
 (D) X is NP, but not necessarily NP-complete
144. Which of the following is false  
 (A) The set of all bijective functions on a finite set forms a group under function composition  
 (B) The set  $\{1, 2, \dots, p-1\}$  forms a group under multiplication modulo 'p' where p is a prime number  
 (C) The set of all strings over a finite alphabet forms a group under concatenation  
 (D) In a group, the identity element is unique

145. Which of the following is not a Boolean algebra
- (A)  $[D_{18}; |]$  (B)  $[D_{21}; |]$   
 (C)  $[D_{110}; |]$  (D)  $[D_{91}; |]$
146. Which of the following statements is false, for the lattice  $[P(A); \subseteq]$
- (A) The upper bound of  $[P(A); \subseteq]$  is A  
 (B) The lower bound of  $[P(A); \subseteq]$  is  $\emptyset$   
 (C) The upper bound of  $[N; \leq]$  does not exist  
 (D) The lower bound of  $[N; \leq]$  is 0
147. The set  $\{2, 3, 5, 30, 60, 120, 180, 360\}; |$  is
- (A) a lattice  
 (B) a join semi lattice  
 (C) a meet semi lattice  
 (D) neither a join semi lattice nor a meet semi lattice
148. How many relations are there on a set with n elements that are reflexive and symmetric?
- (A)  $2^{n(n-1)/2}$  (B)  $2^{n(n+1)/2}$   
 (C)  $2^n$  (D)  $n^2$
149. The problem 3-SAT and 2-SAT are
- (A) Both in P  
 (B) Both NP complete  
 (C) NP-Complete and in P respectively  
 (D) Undecidable and NP-complete respectively
150. Consider the following relations on a set  $A = \{1, 2, 3, 4\}$
- $R_1 = \{(1, 1), (1, 2), (2, 3), (1, 3), (4, 4)\}$   
 $R_2 = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)\}$   
 $R_3 = \{(1, 3), (2, 1)\}$   
 $R_4 = A \times A$
- Which of the following statements is false
- (A)  $R_2$  and  $R_4$  are reflexive  
 (B)  $R_1, R_2$  and  $R_4$  are transitive  
 (C)  $R_1, R_3$  and  $R_4$  are anti-symmetric  
 (D)  $R_1, R_2$  and  $R_4$  are equivalence relations

151. Let  $Q(x, y)$  denote  $x+y=0$  where  $x$  and  $y$  are real numbers. Consider the following quantifications

$$Q_1: \exists y \forall x Q(x, y)$$

$$Q_2: \forall x \exists y Q(x, y)$$

Which of the following is correct

(A)  $Q_1$  is true and  $Q_2$  is false

**(B)**  $Q_1$  is false and  $Q_2$  is true

(C)  $Q_1$  is false and  $Q_2$  is false

(D)  $Q_1$  is true and  $Q_2$  is true

152. The negation of the sentence  $\forall x[C(x)B(x) \rightarrow P(x)]$  is

(A)  $\forall x[C(x)B(x)P(x)]$

**(B)**  $\exists x[C(x)B(x)P(x)]$

(C)  $\forall x[x(C)x(B)x(P)]$

(D)  $\exists x[x(C)x(B)x(P)]$

153. Consider the following arguments

Argument 1 Premise1: If it rains then Harish will be sick

Premise2 : It did not rain

Conclusion : therefore, Harish was not sick

Argument 2 Premise1 : if it rains, Harish will be sick

Premise 2 : Harish was not sick

Conclusion: therefore, it did not rain

Which of the following is correct

(A) Arg 1 is valid and Arg2 is not valid      **(B)** Arg 1 is invalid and Arg 2 is valid

(C) Both the arguments are valid      (D) Both the arguments are invalid

154. Which of the following statements is false

(A) The relation  $\leq$  'less than or equal to' on a set of real numbers is reflexive, transitive and anti-symmetric

**(B)** The relation 'perpendicular to' on the set of lines in a plane is reflexive and symmetric

(C) The relation  $\subseteq$  (set inclusion) on a collection of sets is a partial ordering relation

(D) The relation 'divides' (a/b) on a set of natural numbers is a partial order

155. How many anti-symmetric relations are there on a set with  $n$  elements
- (A)  $2^n \cdot 3^{n(n-1)/2}$  (B)  $2^n$   
 (C)  $n^2$  (D)  $n$
156. Which of the following collection of subsets is partition of  $\{1, 2, 3, 4, 5, 6\}$
- (A)  $\{1, 2\}, \{2, 3, 4\}, \{4, 5, 6\}$  (B)  $\{1, 4, 5\}, \{2, 6\}$   
 (C)  $\{1\}, \{2, 3, 6\}, \{4\}, \{5\}$  (D)  $\{1, 2, 3, 4\}, \{5, 6, 7\}$
157. Which of the following pairs of elements are incomparable in the poset  $[P\{0, 1, 2\}, \leq]$
- (A)  $\{0\}, \{0, 1\}$   
 (B)  $\emptyset, \{0, 1, 2\}$   
 (C)  $\{1, 2\}, \{0, 1, 2\}$   
 (D)  $\{0\}, \{1\}$
158. Consider the poset  $P=\{a, b, c, d, e\}$  shown below
- Which of the following statements is false
- (A)  $P$  is not a lattice  
 (B) The subset  $\{a, b, c, d\}$  of  $P$  is a lattice  
 (C) The subset  $\{b, c, d, e\}$  of  $P$  is a lattice  
 (D) The subset  $\{a, b, c, e\}$  of  $P$  is a lattice
159. Which of the following is not a distributive lattice
- (A)  $[D_8; |]$   
 (B)  $[D_{12}; |]$   
 (C)  $[\{1, 2, 3, 5, 30\}, |]$   
 (D)  $[P\{a, b, c\}, \subseteq]$
160. Which of the following is true
- (A) Every function can be represented graphically  
 (B) The functions  $f(x)=x$  and  $g(x)=\sqrt{x^2}$  are identical  
 (C) The functions  $f(x)=\log x^2$  and  $g(x)=2 \log x$  are identical  
 (D) The domain of  $f(x)=1/(\sqrt{|x|-x})$  is  $(-\infty, 0)$

161. Given the relations  
employee (name, salary, deptno) and  
department (deptno, deptname, address)  
Which of the following queries cannot be expressed using the basic relational algebra operations ( $\cup$ ,  $-$ ,  $\times$ ,  $\pi$ ,  $\sigma$ ,  $\rho$ )?
- (A) Department address of every employee  
(B) Employees whose name is same as their department name  
**(C)** The sum of all employees' salaries  
(D) All employees of a given department
162. Trigger is
- (A) Statement that enables to start any DBMS  
(B) Statement that is executed by the user when debugging an application program  
(C) The condition that the system tests for the validity of the database user  
**(D)** Statement that is executed automatically by the system as a side effect of a modification to the database
163. The order of a leaf node in a B<sup>+</sup> tree is the maximum number of (value, data record pointer) pairs it can hold. Given that the block size is 1K bytes, data record pointer is 7 bytes long, the value field is 9 bytes long and a block pointer is 6 bytes long, what is the order of the leaf node?
- (A) 63 **(B)** 64  
(C) 67 (D) 68
164. A set of FD's F is in minimal form if
- (i) The RHS of any FD of F is a single attribute  
(ii) There are no redundant FDs in F  
(iii) There are no redundant attributes on the LHS of any FD in F
- (A) Only (i) and (ii) (B) Only (ii) and (iii)  
(C) Only (i) and (iii) **(D)** (i), (ii) and (iii)
165. Consider two sets of functions dependencies F and G as  
 $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow A\}$ ,  $G = \{A \rightarrow BC, B \rightarrow A, C \rightarrow A\}$ .  
Then which of the following is true.
- (A) F covers G (B) G cover F  
**(C)** Both A and B (D) Neither A nor B

166. Consider a relation schema  $R(A, B, C)$  with functional dependency  $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow A\}$ . The relation schema is decomposed into two schemas  $R_1 = \{A, B\}$  and  $R_2 = \{B, C\}$ . Which one of the following is true?
- (A) The decomposition is lossless and dependency preserving  
 (B) The decomposition is lossy and dependency preserving  
 (C) The decomposition is lossless and not dependency preserving  
 (D) The decomposition is lossy and not dependency preserving
167. Which of the following is not True ?
- S1: If any given schedule is conflict serializable then it is view serializable  
 S2: Primary indices are dense indices
- (A) S1 (B) S2  
 (C) S1 and S2 (D) Neither S1 nor S2
168. What is minimum utilization space for a  $B^+$  tree index ?
- (A) 60% (B) 50%  
 (C) 66% (D) 75%
169. Which of the following is True regarding the 'Scheduler' ?
- (A) The scheduler is the DBMS component that establishes the order in which concurrent database operations are executed  
 (B) The scheduler interleaves the execution of the database operations (belonging to several concurrent transactions) not to ensure the serializability of transactions  
 (C) Both A and B  
 (D) Neither A nor B
170. Relation student has 15 tuples and one of its attributes, "Marks" is associated with NOT NULL and UNIQUE constraint.
- What is the output of the following statement ?
- `SELECT COUNT (*) FROM student WHERE Marks > ALL (SELECT Marks FROM Student);`
- (A) 15 (B) 14  
 (C) 10 (D) 0

171. Consider the following schedules

S1 : r1(X) ; w1(X) ; r1(Y) ; w1 (Y) ; r2(X) ; w2(X) ; C2; C1;

S2 : r1(X) ; w1(X) ; r2(X) ; r1(Y) ; w2(X) ; w1(Y) ; C1 ; C2;

Which of the following is true ?

(A) Both S1 and S2 are recoverable

(B) S1 is recoverable but S2 is not

**(C)** S2 is recoverable but S1 is not

(D) Both schedules are non-recoverable

172. Identify the problem associated with following schedule

T2:R(X) ; T2:R(Y) ; T1:R(X) ; T1:R(Y) ; T1:W(X), T1:COMMIT, T2:R(X), T2:COMMIT;

(A) Phantom phenomenon

(B) Dirty read

**(C)** Unrepeatable read

(D) Both (B) and (C)

173. Suppose the search key field of a B-tree V is 8 bytes long, its disk block size B is 512 bytes, a record pointer  $P_r$  is 6 bytes long and a block pointer P is 5 bytes. Assume that each node of B-Tree is 69 per cent full. Find the average number of keys per node of this B-tree

**(A)** 17

(B) 18

(C) 19

(D) 20

174. Let F denotes the set of functional dependencies,  $F=\{A \rightarrow BC, B \rightarrow C, AB \rightarrow D\}$  Then which of the following statements is / are True ?

S1 : C is extraneous in the consequent of  $A \rightarrow BC$ .

S2 : B is extraneous in the determinant of  $AB \rightarrow D$ .

(A) S1 only

(B) S2 only

**(C)** Both S1 and S2

(D) Neither S1 nor S2

175. A relation schema R(ABCD) with Functional dependency set

$F = \{AB \rightarrow CD, C \rightarrow A\}$ , How many prime attributes are there in R?

(A) 1

(B) 2

**(C)** 3

(D) 4

176. Let block size be 512 bytes, record pointer be 9 bytes, block pointer be 8 bytes and key field be 4 bytes. Then the order of internal node and leaf node in  $B^+$ Tree, respectively

**(A)** 43, 39

(B) 44, 40

(C) 51, 45

(D) 52, 42

177. Consider the relation R(ABCD) with functional dependencies  
 $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow D\}$ , The highest normal form of the relation R is  
 (A) Boyce-Codd normal form  
 (B) Third normal form  
 (C) Second normal form  
 (D) First normal form
178. Consider the following queries :  
 Q1 : select max(sal) from emp groupby deptno having dept no  $\neq 10$  ;  
 Q2 : select max(sal) from emp where dept no  $\neq 10$  group by dept no;  
 Which query will give maximum salary of each department except department number 10 from 'emp' table ?  
 (A) Only Q1 (B) Only Q2  
 (C) Both Q1 and Q2 (D) None of these
179. The minimal cover of the set of functional dependencies  $\{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$  is  
 (A)  $\{A \rightarrow C, B \rightarrow C\}$  (B)  $\{AB \rightarrow B, B \rightarrow C\}$   
 (C)  $\{A \rightarrow B, B \rightarrow C\}$  (D)  $\{A \rightarrow BC, AB \rightarrow C\}$
180. Relational Algebra is a  
 I. Procedure language  
 II. Non-procedure language  
 III. Algebraic language  
 IV. Declarative language  
 (A) Both II and IV (B) Both I and III  
 (C) Both I and IV (D) Both II and III
181. The necessary conditions needed before deadlock can occur?  
 (A) No Mutual Exclusion, Hold and wait, Preemption, Circular Wait  
 (B) Mutual Exclusion, No Hold and wait, Preemption, Circular Wait  
 (C) Mutual Exclusion, Hold and wait, No Preemption, Circular Wait  
 (D) Mutual Exclusion, Hold and wait, Preemption, No Circular Wait

182. **Cached and interleaved memories are ways of speeding up memory access between CPUs and slower RAM. Which memory models are best suited (i. e. improves performance the most) for which programs?**
- (i) **Cached memory is best suited for small loops.**
  - (ii) **Interleaved memory is best suited for small loops.**
  - (iii) **Interleaved memory is best suited for large sequential code.**
  - (iv) **Cached memory is best suited for large sequential code.**

**Identify the correct option?**

- (A) (i) and (ii) are true
  - (B) (i) and (iii) are true
  - (C) (iv) and (ii) are true
  - (D) (iv) and (iii) are true
183. **In Round Robin CPU scheduling, as the time quantum is increased, the average turnaround time**
- (A) increases
  - (B) decreases
  - (C) remains constant
  - (D) varies irregularly
184. **Consider a set of 5 processes whose arrival time, CPU time needed and the priority are given below**

| Process Priority | Arrival Time (in ms) | CPU Time Needed (in ms) | Priority |
|------------------|----------------------|-------------------------|----------|
| P1               | 0                    | 10                      | 5        |
| P2               | 0                    | 5                       | 2        |
| P3               | 2                    | 3                       | 1        |
| P4               | 5                    | 20                      | 4        |
| P5               | 10                   | 2                       | 3        |

**The meaning of the value of priority as “Smaller the number, higher the priority”. What is the average waiting time for the priority scheduling with pre-emption policy?**

- (A) 19ms
  - (B) 7.6ms
  - (C) 6.8ms
  - (D) None of these
185. **Locality of reference implies that the page reference being made by a process**
- (A) **Will always be to be the page used in the previous page reference.**
  - (B) **Is likely to be one of the pages used in the last few page reference.**
  - (C) **Will always be one of the page existing in memory**
  - (D) **Will always leads to a page fault**

186. In which page replacement method, the property “A memory page containing a heavily used variable that was initialized very early and is in constant use” is discarded.
- (A) FIFO (B) LFU  
(C) LRU (D) None of these
187. Which of the following scheduling policy is well suited for a time-shared operating system?
- (A) Shortest job first (B) Round robin  
(C) First-come-first-serve (D) Elevator
188. Which of the following scheduling algorithms gives minimum average waiting time?
- (A) FCFS (B) SJF  
(C) Round-robin (D) Priority
189. Which of the following does not occur during the power-on-self-test (POST)?
- (A) The scandisk utility begins to run  
(B) The video card and video memory are tested  
(C) The BIOS identification process occurs  
(D) Memory chip are checked to ensure that they are working properly
190. Virtual Memory is
- (A) Extremely Large Main memory  
(B) Extremely Large Secondary memory  
(C) An illusion of extremely large main memory  
(D) An illusion of extremely large secondary memory
191. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for SSTF disk-scheduling algorithms?
- (A) 7081 (B) 1745  
(C) 3319 (D) 3363
192. In a paged memory, the page hit ratio is 0.35. The time required to access a page in secondary memory is equal to 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is
- (A) 3.0 ns (B) 68.0 ns  
(C) 68.5 ns (D) 78.5 ns

193. **Thrashing**
- (A) Reduces page I/O
  - (B) Decreases the degree of multi programming
  - (C) Implies excessive page I/O**
  - (D) Improves the system performance
194. **For implementing a multiprogramming operating system require**
- (A) Special support from processor is essential
  - (B) Special support from processor is not essential**
  - (C) Cache memory must be available
  - (D) More than one processor must be available
195. **Which of the following is true?**
- (A) Overlays are used to increase the size of physical memory
  - (B) Overlays are used to increase the logical address space
  - (C) When overlays are used, the size of a process is not limited to the size of physical memory**
  - (D) Overlays are used whenever the physical address space is smaller than the logical address space
196. **Page stealing**
- (A) Is a sign of an efficient system
  - (B) Is taking page frame from other working sets**
  - (C) Should be the turning goal
  - (D) Is taking layer disk space for page in page out
197. **Which of the I/O scenarios uses all the design concepts such as buffering, spooling, caching**
- (A) A mouse used with a graphical user interface
  - (B) A tape drive on a multitasking operating system (assume no device pre-allocation is available)**
  - (C) A disk drive containing user files
  - (D) A graphics card with direct bus connection, accessible through memory-mapped I/O

198. A state is safe if the system can allocate resources to each process (up to its maximum) in some order and still avoid deadlock.
- Which of the following are false?
- (A) Deadlocked state is unsafe
  - (B) Unsafe state may lead to a deadlock situation
  - (C) Unsafe state must lead to a deadlock situation**
  - (D) Deadlocked state is a subset of unsafe state
199. At a particular time of computation, the value of a counting semaphore is 7. Then 20 P operations and 'x' V operations were completed on this semaphore. If the final value of the semaphore is 5, x will be
- (A) 22
  - (B) 18**
  - (C) 15
  - (D) 13
200. First-in-First-Out (FIFO) scheduling is
- (A) Non Pre-emptive Scheduling**
  - (B) Pre-emptive Scheduling
  - (C) Fair Share Scheduling
  - (D) Deadline Scheduling
201. Identify the correct sequence in which the following packets are transmitted on the network by a host when a browser requests a webpage from a remote server, assuming that the host has just been restarted.
- (A) HTTP GET request, DNS query, TCP SYN
  - (B) DNS query, HTTP GET request, TCP SYN
  - (C) DNS query, TCP SYN, HTTP GET request**
  - (D) TCP SYN, DNS query, HTTP GET request
202. Bit stuffing refers to
- (A) inserting a '0' in user stream to differentiate it with a lag**
  - (B) inserting a '0' in lag stream to avoid ambiguity
  - (C) appending a nibble to the lag sequence
  - (D) appending a nibble to the use data stream
203. If a network designer wants to connect 5 routers as point-to-point simplex line, then total number of lines required would be
- (A) 5
  - (B) 10**
  - (C) 20
  - (D) 32

204. A station in a network forward incoming packets by placing them on its shortest output queue. What routing algorithm is being used ?
- (A) Hot potato routing (B) Folding  
(C) Static routing (D) Delta routing
205. In which routing method do all the routers have a common database?
- (A) Distance vector (B) Link state  
(C) Link vector (D) None of these
206. In sliding window flow control, if window size is 63, what is the range of sequence numbers?
- (A) 0 to 63 (B) 0 to 64  
(C) 1 to 63 (D) 1 to 64
207. Error detection at the data link level is achieved by
- (A) Bit stuffing (B) Cyclic redundancy code  
(C) Hamming codes (D) Equalization
208. In an Ethernet local area network, which one of the following statement is TRUE?
- (A) A station stops to sense the channel once it starts transmitting a frame.  
(B) The purpose of the jamming signal is to pad the frames that are smaller than the minimum frame size.  
(C) A station continues to transmit the packet even after the collision is detected.  
(D) The exponential back-off mechanism reduces the probability of collision on retransmissions
209. Which of the following is not a transceiver function?
- (A) Transmission and receipt of data  
(B) Checking of line voltages  
(C) Addition and subtraction of headers  
(D) Collision detection
210. A 100 km long cable runs at the T1 data rate. The propagation speed in the cable is half the speed of light. How many bits is in the cable?
- (A) 772 (B) 672  
(C) 572 (D) 873

211. Which of the following access control methods is probabilistic?  
 (A) Polling (B) Contention  
 (C) Token passing (D) Sliding window
212. The \_\_\_\_\_ measures the number of lost or garbled messages as a fraction of the total sent in the sampling period.  
 (A) Residual Error rate  
 (B) Transfer failure probability  
 (C) Connection release failure probability  
 (D) Connection establishment failure probability
213. How many characters per sec(7bits + 1 parity) can be transmitted over a 2400 bps line if the transfer is synchronous(1 start and 1 stop bit)  
 (A) 300 (B) 240  
 (C) 250 (D) 275
214. Manchester code is a  
 (A) Bi-polar code, return to zero code (B) Polar code, non-return to zero code  
 (C) Polar code, return zero code (D) Bi-polar code, non-return zero code
215. In which of the pair of protocols uses multiple TCP connections between the same client and server?  
 (A) HTTP, FTP (B) HTTP, TELNET  
 (C) FTP, SMTP (D) HTTP, SMTP
216. Match the following based on “In which layer the following devices are used in computer networks.”  
 P : HUB I. Network layer  
 Q : Bridge II. Physical layer  
 R : Router III. Transport layer  
 S : Gateways IV. Data link layer  
 (A) P - I, Q - III, R - II and S - IV (B) P - II, Q - IV, R - I and S - III  
 (C) P - III, Q - II, R - I and S - IV (D) P - IV, Q - II, R - III and S - I
217. What is the maximum size of data that the application layer can pass on to the TCP layer below:  
 (A)  $2^{16}$  bytes (B) Any size  
 (C)  $2^{15}$  bytes (D) 1500 bytes

218. Which of the following is not a Client Server application
- (A) Internet Chat (B) Web browsing  
(C) E-mail (D) Ping
219. The minimum bandwidth required for Voice Call in Analog Telephone network is
- (A) 4KB (B) 64KB  
(C) 32KB (D) 128KB
220. Which of the following is not a local area network standard?
- (A) 802.3 (B) 802.4  
(C) 802.5 (D) 803.2
221. Level of detail stored in a dimension table is termed as \_\_\_\_\_
- (A) Row (B) Dimension  
(C) Granularity (D) Fact
222. Consider the following statements:
- I. Snowflaking does not resolve the fast changing dimensions  
II. Redundancy is minimized in snowflake schema
- Which of the following is correct?
- (A) I and II are correct (B) I is correct  
(C) II is correct (D) I and II are incorrect
223. A fact table with only foreign keys and no facts is termed as \_\_\_\_\_
- (A) Non-additive fact (B) Factless fact  
(C) Derived fact (D) Textual fact
224. Consider the following statements:
- I. Data Mining focuses on analysing the data content rather than responding to questions.  
II. Data Mining help to discover new insights about business
- Which of the following is correct?
- (A) Both are correct (B) I is correct  
(C) II is correct (D) Both are false

225. \_\_\_\_\_ index eliminates join of tables
- (A) Binary (B) Bitmap  
(C) Join (D) Primary key
226. Consider the following statements:
- I. Top level executives are the target users for dashboard applications.  
II. Dashboards provide the management with a low level view of the data.
- Which of the following is correct:
- (A) Both are correct (B) Both are incorrect  
(C) I is correct (D) II is correct
227. Which of the following is not related multi dimensional analysis?
- (A) Pivoting (B) Drill down  
(C) Dicing (D) Reporting
228. Consider the following statements:
- I. Many-many tables in Entity-Relationship model are converted to dimensional model fact tables.  
II. Surrogate key connects directly to the fact table
- Which of the following is correct?
- (A) Both are correct (B) Both are incorrect  
(C) I is correct (D) II is correct
229. A dimension having low cardinality columns such as codes, indicators and status flags is termed as \_\_\_\_\_
- (A) Junk dimension (B) Role-playing dimension  
(C) Mini-dimension (D) Star dimension
230. Which of the following is not related to Non-additive fact?
- (A) Textual facts (B) Per-unit prices  
(C) Facts based on averages (D) Account balances
231. Which phase of data analytics life cycle need more than 50% of effort?
- (A) Discovery Phase (B) Data preparation phase  
(C) Model building phase (D) Interpretation phase

232. Map reduce Algorithm is suitable for problems with features \_\_\_\_\_ and \_\_\_\_\_  
 (A) Parallelism and key-value format  
 (B) Non parallelism and key-value format  
 (C) Parallelism and relational format  
 (D) Relational and key-value format
233. \_\_\_\_\_ stores are used to store information about networks, such as social connections.  
 (A) Key-value (B) Wide-column  
 (C) Document (D) Graph
234. Which of the following is not window function in SQL?  
 (A) Row\_number() (B) Rank()  
 (C) Dense\_rank() (D) Sum()
235. The Acronym MAD in MADlib open source library used for scalable in-database analytics  
 (A) Magnetic, Agile, Deep (B) Mobile, Agile, Deep  
 (C) Mobile, Agile, Disk (D) Magnetic, Agile, Disk
236. Which of the following is not related to non-relational database category?  
 (A) Document Model (B) Graph Model  
 (C) Wide Column Model (D) MySQL
237. I. The wide column model provides less granular access to data than key value model.  
 II. The Wide column model provide less flexibility than the document data model.  
 Which of the following is correct?  
 (A) Both I and II are true (B) Both I and II are false  
 (C) Only II is true (D) Only I is true
238. Which of the following NoSQL database belong to Wide-Column Store type?  
 (A) Cassandra (B) Riak  
 (C) MongoDB (D) Redis
239. Forward reasoning is a techniques used for  
 (A) Converting a recursive version to a non-recursive version  
 (B) Searching from goal state to start state  
 (C) Searching from start state to goal state  
 (D) Clipping and windowing

240. Many NoSQL databases supports automatic \_\_\_\_\_, meaning that high availability and disaster recovery
- (A) Processing (B) Replication  
(C) Scalability (D) Recovery
241. Large Companies have limit to use data warehousing due to high cost of development. In such situations, companies use a lower cost, scaled down version of data warehouse. The name of such data warehouse is termed as \_\_\_\_\_
- (A) Distributed database (B) Operational data Store  
(C) Dependent data mart (D) Independent data mart
242. Apriori Algorithm is used for \_\_\_\_\_
- (A) forming clusters (B) classifying the objects  
(C) Association Rule generation (D) None of the above
243. What is networked virtual memory ?
- (A) Caching (B) Segmentation  
(C) RAM disk (D) None of these
244. SCP protocol is evolved from \_\_\_\_\_ over SSH.
- (A) RCP protocol (B) DHCP protocol  
(C) MGCP protocol (D) none of the mentioned
245. In distributed systems, link and site failure is detected by
- (A) polling (B) handshaking  
(C) token passing (D) none of the mentioned
246. A \_\_\_\_\_ is a program that secretly takes over another Internet-attached computer and then uses that computer to launch attacks.
- (A) Worm (B) Zombie  
(C) Virus (D) Trap doors
247. The \_\_\_\_\_ is code embedded in some legitimate program that is set to "explode" when certain conditions are met.
- (A) Trap doors (B) Trojan horse  
(C) Logic Bomb (D) Virus

248. Which one of the following is a cryptographic protocol used to secure HTTP connection?  
(A) stream control transmission protocol (SCTP)  
**(B) transport layer security (TSL)**  
(C) explicit congestion notification (ECN)  
(D) resource reservation protocol
249. When a DNS server accepts and uses incorrect information from a host that has no authority giving that information, then it is called  
(A) DNS lookup (B) DNS hijacking  
**(C) DNS spoofing** (D) none of the above
250. According to the ring algorithm, links between processes are  
(A) bidirectional **(B) unidirectional**  
(C) both (A) and (B) (D) none of the mentioned
251. Which of these statements is true about packet switching networks?  
(A) Resource allocation is done for a packet beforehand  
(B) Bandwidth is reserved on the links  
(C) Scheduled processing for a packet  
**(D) Resource allocation is done on demand**
252. Adaptive routing algorithms get their information from \_\_\_\_\_  
(A) only from local environment  
(B) only from adjacent routers  
**(C) from locally, adjacent, external routers**  
(D) only from external routers
253. What is dispatch latency?  
**(A) The time taken by the dispatcher to stop one process and start another**  
(B) The time taken by the processor to write a file into disk  
(C) The whole time taken by all processor  
(D) None of above
254. Which of the following unix system call creates a new process?  
(A) EXEC (B) LINK  
**(C) FORK** (D) STAT

255. Which of the following statements are true?
- I. Shortest remaining time first scheduling may cause starvation
  - II. Pre-emptive scheduling may cause starvation
  - III. Round robin is better than FCFS in terms of responsive time
- (A) I only (B) I and II only  
(C) II and III only (D) I, II and III
256. Which of the following is not related to mobile computing?
- (A) GSM (B) CDMA  
(C) ANDROID (D) RGB
257. Mobile IP registration is done by
- (A) UDP datagram (B) HTTP protocol  
(C) HTML home page (D) File Transfer Protocol
258. Which of the following processes ensures that the issue of credit card is an approved transaction?
- (A) Payment (B) purchase report  
(C) Purchase reply (D) payment authentication
259. The minimum bandwidth required for Voice Call in Analog Telephone network is
- (A) 4KB (B) 64KB  
(C) 32KB (D) 128KB
260. Binary number of  $(41.6875)_{10}$  is \_\_\_\_\_
- (A) 101001.0111000111101 (B) 101001.111000111101  
(C) 101001.1101 (D) 101001.1011
261. Principle of detailing data that does not conform to normal conditions is referred to as
- (A) singular reporting (B) highlight listing  
(C) exception reporting (D) abnormal reporting
262. Desk chucking is involved with
- (A) debugging the program (B) coding the program  
(C) running the program (D) compiling the program

263. Checking the quality of software in both simulated and line environments, is called
- (A) checking (B) usability  
(C) validity (D) validation
264. On an average, the programmer months is given by  $3.6 * (KDSI)^{1.2}$  (thousand delivered source instructions (KDSI)). How many programmer months are needed for one thousand source instructions?
- (A) 3.6 PM (B) 0.36 PM  
(C) 0.0036 PM (D) 7.23 PM
265. According to Brooks: If, n is the number of programmers in a project team, then the number of communication path is
- (A)  $n(n-1)/2$  (B)  $n \log n$   
(C) n (D)  $n(n+1)/2$
266. The preliminary evaluation of a top-down design before programs are written is referred to a (an)
- (A) scheduled review (B) structured walkthrough  
(C) formal design review (D) informal design review
267. Top management of an organization is more interested in
- (A) tactical decisions (B) day-to-day operations  
(C) strategic decisions (D) Intuitive Decisions
268. Which of the following is not a characteristic of structured system development?
- (A) Partitioning of systems into manageable levels of detail  
(B) Specification of the interfaces between modules  
(C) The use of graphical tools, such as dataflow diagrams to model system  
(D) All of the above are characteristics
269. To increase reliability, fault tolerance is included in the system in the form of multiple modules. If the problem can be solved by 5 different modules, each with probability of success 0.7, the probability that it can be solved even if 4 modules fail is approximately
- (A) 0.3 (B) 0.03  
(C) 0.49 (D) 0.05

270. Which of the following is a desirable property of a module?  
**(A) Independency** (B) Low Cohesiveness  
(C) High Coupling (D) Multi-Functional
271. Data Structure suitable for the application is discussed in  
**(A) data design** (B) architectural design  
(C) procedural design (D) interface design
272. Structured design methodology is an approach to design that adheres to rules based on principles such as  
(A) bottom-up design (B) top-down refinement  
**(C) data flow analysis** (D) all of these
273. Structured design methodology is an approach to design that adheres to rules based on principles such as  
(A) bottom-up design **(B) top-down refinement**  
(C) data flow analysis (D) all of the above
274. In one of the following coupling techniques, one component surreptitiously modifies data that is internal to another component  
**(A) Content Coupling** (B) Common coupling  
(C) Control coupling (D) Stamp coupling
275. The process of changing the software system in such a way that it does not alter the external behaviour of the code yet it improves the internal structure is  
**(A) Refactoring** (B) Reverse engineering  
(C) Corrective maintenance (D) Systems Engineering
276. Why are cyber vulnerabilities unlikely to ever go away?  
(A) Criminals need them to steal identities  
**(B) They are side effects of the freedom and ease of communicating online**  
(C) The government won't allow people to fix them  
(D) They are protected in a secret base on the moon

277. The expansion of size and complexity of networks is due to
- (A) Only universities owned computers
  - (B) Spamware caused some computers to break down
  - (C) Increase in number of computers**
  - (D) Hacktivists started using internet
278. The Term “Hacktivism” means that
- (A) Hacking for a cause**
  - (B) Hacking ruthlessly
  - (C) An association which groups activists
  - (D) None of the above
279. Which of the following activities will NOT be considered as passive footprinting?
- (A) Go through the rubbish to find out any information that might have been discarded.
  - (B) Search on financial site such as Yahoo Financial to identify assets.
  - (C) Scan the range of IP address found in the target DNS database.**
  - (D) Perform multiples queries using a search engine.
280. Which one of the following is defined as the process of distributing incorrect Internet Protocol (IP) addresses/names with the intent of diverting traffic?
- (A) Network aliasing
  - (B) Domain Name Server (DNS) poisoning**
  - (C) Reverse Address Resolution Protocol (ARP)
  - (D) Port scanning
281. Which language is used to build twitter message server queue?
- (A) Scala** (B) R
  - (C) Python (D) MongoDB
282. SWIFT Stands for
- (A) Society for Worldwide Internet Financial Telecommunications
  - (B) Society for worldwide interbank Telecommunications
  - (C) Secret Wide Interbank Financial Telecommunications
  - (D) None of the above**

283. GFCI Means  
(A) Gross Fibre Capital Investment (B) Gross Fixed Capital Investment  
(C) Gross Fixed Corporation of India (D) Gross Food Corporation of India
284. \_\_\_\_\_ is allowed for companies to handle the purchasing process electronically  
(A) Multiplexer Data Interchange (B) Electronic Data Interchange  
(C) Electronic Data Change (D) Multiplexer Data Change
285. VAN stands for  
(A) Volume Added Network (B) Variety Added Network  
(C) Value Added Network (D) Vendor Added Network
286. The concept in which organizations adapt to new conditions or alter their practices over time is termed as \_\_\_\_\_  
(A) Organizational learning (B) Organizational change  
(C) Continuous improvement (D) Reengineering
287. e-bay is an example of which of the following forms of e-commerce?  
(A) A2B (B) B2B  
(C) B2C (D) C2C
288. Which of the following is a frequent advantage of converting to an e-commerce supply chain?  
(A) A decrease in transportation costs  
(B) An increase in available product inventory  
(C) Acquisition of expensive information systems technology  
(D) An improved level of customer service
289. Which of the following is not one of the basic components of Transaction Processing Systems (TPS)?  
(A) Databases (B) Networks  
(C) Procedures (D) Analytical models
290. A decision that inventory should be ordered when inventory levels drop to 1000 units is an example of a(n) \_\_\_\_\_  
(A) Synchronous decision (B) Asynchronous decision  
(C) Non-programmed decision (D) Programmed decision

291. What employs tools, techniques, and methodologies designed to speed application development?
- (A) Joint optimization (B) Rapid application development  
(C) Prototyping (D) Extended application development
292. A form of parallel processing in which a number of computers, often owned by multiple individuals or organizations, work in a coordinated manner to solve a common problem is called \_\_\_\_\_.
- (A) Massively parallel processing (B) Multicore processing  
(C) Grid computing (D) Coprocessing
293. Three fundamentals strategies for providing data storage are \_\_\_\_\_
- (A) Expandable, nonexpandable, and static  
(B) Attached storage, network-attached storage, and storage area networks  
(C) Sequential, direct, indirect  
(D) Hard drive, CD-ROM, DVD
294. \_\_\_\_\_ Projects within National e-Governance Plan (NeGP) will consider with clearly defined objectives, scopes, and implementation timelines and milestones, as well as measurable outcomes and service levels
- (A) Mission Mode (B) Academic  
(C) Undergraduate (D) Research oriented
295. The expansion of the Acronym NSDG is
- (A) National e-Governance Service Delivery Gateway  
(B) National Service Delivery Gateway  
(C) National Security Database Gadget  
(D) National Security Delivery Gateway
296. Mobile e-Governance Delivery Gateway (MSDG) is developed based on
- (A) Interoperability exchange Protocol/Interoperability Interface Specifications  
(B) Interoperability Interface Protocol / Interoperability Interface Specifications  
(C) Inter-object oriented Interface protocol /Interoperability Interface Specifications  
(D) Inter-related Interface process/Interoperability Interface Specifications

297. Which of the following is not the principle considered in design and implementation of e-Kranti project
- (A) Integrated Services (B) Infrastructure on Demand  
(C) Cloud by Default (D) Non-Integrated Service
298. Setting up of Finishing Schools is part of \_\_\_ policy initiated by Gujarat Government.
- (A) IT (B) BT  
(C) Power (D) Road
299. \_\_\_\_\_ is owned by Government of Gujarat for Voice Communication needs.
- (A) SWAGAT-online (B) GSWAN  
(C) SICN (D) E-CITY
300. \_\_\_\_\_ provides Document Management, Workflow Management, Collaborative Environment and Knowledge Management in an integrated fashion and delivers an Electronic Workplace that result in productivity improvement in Gujarat Government.
- (A) IMDWS (B) E-Dhara  
(C) E-gram (D) Data Centre