

103/2022

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. Which of the following statement is/are correct?
- (i)  $A - B = A \cap B'$   
(ii)  $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$   
(iii)  $(A - B) \cap (B - A) = \phi$
- (A) only (i) and (ii) (B) only (iii)  
(C) all of the above (i), (ii) and (iii) (D) only (i) and (iii)
2. Consider a vocabulary with only four prepositions  $A, B, C$  and  $D$ . How many models are there for the following sentence?  $B \vee C$
- (A) 10 (B) 12  
(C) 15 (D) 16
3. What is the maximum cardinality of a relation  $R$  on a set  $S = [x, y, z]$  such that relation  $R$  is Anti-symmetric?
- (A) 8 (B) 3  
(C) 5 (D) 6
4.  $(n^2 + n)$  is \_\_\_\_\_ for all  $n \in N$  :
- (A) Even (B) Odd  
(C) Either even or odd (D) None of these
5. Let  $P$  : This is a good question paper.  $Q$  : You should not come back here. Then 'This is a great question paper and you should come back here'. is best represented by
- (A)  $\sim P \vee \sim Q$  (B)  $P \wedge \sim Q$   
(C)  $P \vee Q$  (D)  $P \wedge Q$
6. In a Group of 200 people, 50 can speak Hindi and 199 can speak English. How many can speak both Hindi and English?
- (A) 49 (B) 50  
(C) 1 (D) none of these
7. How many integer solutions there are to the equation  $x_1 + x_2 + x_3 + x_4 = 18$  if  $x_i \geq 0$  for  $1 \leq i \leq 4$ ?
- (A) 1330 (B) 1540  
(C) 18 (D) 588

A

3

[P.T.O.]

8. A number is chosen at random among the first 120 natural numbers (1, 2, 3,...,120). The probability of the number chosen being a multiple of 5 or 15 :
- (A)  $\frac{1}{8}$  (B)  $\frac{1}{5}$   
(C)  $\frac{1}{16}$  (D)  $\frac{1}{24}$
9. An urn contains 6 red balls and 6 black balls. In the first draw, one ball is picked at random and discarded without noticing its colour. The probability to get a red ball in the second draw is :
- (A)  $\frac{13}{22}$  (B)  $\frac{9}{22}$   
(C)  $\frac{1}{2}$  (D)  $\frac{1}{24}$
10. Three companies A, B and C supply 25%, 35% and 40% of the notebooks to a school. Past experience shows that 5%, 4% and 2% of the notebooks produced by these companies are defective. If a notebook was found to be defective, what is the probability that the notebook was supplied by A?
- (A)  $\frac{43}{69}$  (B)  $\frac{13}{22}$   
(C)  $\frac{25}{69}$  (D)  $\frac{7}{24}$
11. Correlation coefficient lies in between :
- (A) 0 to  $\infty$  (B) -1 to 1  
(C) -1 to 0 (D) -1 to  $\infty$
12. If the regression coefficient of Y on X is 2. Then the regression coefficient of X on Y is :
- (A)  $\leq \frac{1}{2}$  (B) 2  
(C)  $> \frac{1}{2}$  (D) 1
13. A circular queue of characters is implemented using a linear array whose first index is 1. The array currently contains the elements d, -, -, a, b, c starting from index 1. Here '-' denotes empty slot. If two elements are deleted and three are added, what are the new positions of rear and front?
- (A) 6, 1 (B) 4, 6  
(C) 5, 3 (D) 3, 5
14. The postfix expression for the infix expression  $x^y/(5*z)+10$  is :
- (A)  $x y ^5 z * /10 +$  (B)  $x y 5 * z ^ /10 +$   
(C)  $x y ^5 z * 10 / +$  (D)  $x y 5 z ^ * /10 +$

15. The maximum degree of any vertex in a simple graph with  $n$  vertices is :
- (A)  $n+1$  (B)  $n-1$   
(C)  $2n-1$  (D)  $n$
16. Given, the hash function  $h(k) = k \bmod 3$ , what is the number of collisions to store the following sequence of keys? 15, 11, 34, 10, 98, 51, 37, 14, 16, 47
- (A) 2 (B) 3  
(C) 9 (D) 7
17. A hash function  $f$  defined as  $f(\text{key}) = \text{key} \bmod 7$ , with linear probing used to resolve collisions. Insert the keys 37, 38, 72, 48, 98 and 11 into the table indexed from 0 to 6. What will be the location of 11?
- (A) 3 (B) 5  
(C) 4 (D) 6
18. What is the maximum height of any AVL tree with 7 nodes? Assume that the height of a tree with a single node is 0 :
- (A) 2 (B) 3  
(C) 4 (D) 5
19. Which of the following is not a keyword in C language?
- (A) string (B) auto  
(C) long (D) sizeof
20. What is the output of the following C program?
- ```
#include <stdio.h>
int main()
{
    int i = 0;
    for (i=0; i<20; i++)
    {
        switch(i)
        {
            case 0: i += 5;
            case 1: i += 2;
            case 5: i += 5;
            default: i += 4;
                break;
        }
        printf ("%d ", i);
    }
    return 0;
}
```
- (A) 5 10 15 20 (B) 7 12 17 22  
(C) 16 21 (D) Compiler Error

21. Which of the following statement is correct for *switch* controlling expression:
- (A) only int can be used in switch controlling expression
  - (B) only int and char can be used in switch controlling expression
  - (C) only int, char and float can be used in switch controlling expression
  - (D) switch controlling expression can be empty also
22. What is the meaning of following declaration in C language?
- ```
Int (*p)[5];
```
- (A) p is a pointer to 5 integers
  - (B) p is a pointer to an integer array
  - (C) p is an array of 5 pointers to integers
  - (D) p is a pointer to an array of 5 integers
23. Which of the following initializations of 2D arrays is correct?
- (i) `int array[2][4] = {1, 2, 3, 4, 5, 6, 7, 8};`
  - (ii) `int array[ ][4] = {1, 2, 3, 4, 5, 6, 7, 8};`
  - (iii) `int array[2][ ] = {1, 2, 3, 4, 5, 6, 7, 8};`
  - (iv) `int array[ ][ ] = {1, 2, 3, 4, 5, 6, 7, 8};`
- (A) all are correct
  - (B) only (i) is correct
  - (C) only (i) and (ii) is correct
  - (D) only (i) and (iii) is correct
24. What is the output of the following C program?
- ```
#include <stdio.h>
#define square (x) x*x
int main()
{
    int x;
    x = 36/square(6);
    printf("%d", x);
    return 0;
}
```
- (A) 1
  - (B) 36
  - (C) 0
  - (D) Compiler Error
25. The simplified function in sum of products of Boolean function  $F(P, Q, R, S) = \Sigma(0, 2, 5, 7, 8, 10, 13, 15)$ , where the minterms 2, 7, 8 and 13 are don't care terms:
- (A)  $QS' + Q'S$
  - (B)  $Q'S' + QS$
  - (C)  $Q'R'S' + Q'RS' + QR'S + QRS$
  - (D)  $P'Q'S' + P'QS + PQS + PQ'S'$

26. Given code word 1110001010 to be transmitted with an even parity check bit. The encoded word to be transmitted for this code is :
- (A) 11100010101 (B) 11100010100  
(C) 1110001010 (D) 111000101
27. The minimum number of flip flops required to design a decade counter is:
- (A) 3 (B) 4  
(C) 5 (D) 6
28. Power dissipation is minimum in:
- (A) TTL (B) RTL  
(C) CMOS (D) DTL
29. Which addressing mode is used in the given 8086 instruction = MOV AX, [1234H]?
- (A) Immediate Addressing Mode (B) Base Addressing Mode  
(C) Indexed Addressing Mode (D) Direct Addressing Mode
30. How many 16 bit segment registers does 8086 have?
- (A) 4 (B) 8  
(C) 2 (D) 6
31. Belady's anomaly occurs in which algorithm?
- (A) Optimal algorithm (B) FIFO algorithm  
(C) SSTF algorithm (D) Elevator algorithm
32. Banker's algorithm is used in :
- (A) Deadlock prevention (B) Deadlock avoidance  
(C) Deadlock detection (D) Deadlock recovery
33. A counting semaphore is initialized to 4. Then 8 P(wait) and 3 V (signal) operations are performed on the semaphore. The final value of the semaphore is :
- (A) -1 (B) 1  
(C) 2 (D) -2
34. A system supports a virtual address space of 4096 pages each with 512 bytes. If the main memory has 1024 frames, the number of bits in physical address is :
- (A) 20 (B) 23  
(C) 21 (D) 19

35. The method for updating the main memory as soon as a word is removed from the Cache is called :
- (A) write-through (B) write-back  
(C) protected write (D) cache-write
36. If the disk head is located initially at 32, find the number of disk moves required with FCFS if the disk queue of I/O blocks requests are 98, 37, 14, 124, 65 and 72 :
- (A) 319 (B) 326  
(C) 338 (D) 360
37. The interrupt servicing mechanism in which the requesting device identifies itself to the processor to be serviced is :
- (A) polling (B) vectored interrupts  
(C) interrupt nesting (D) simultaneous requesting
38. A process executes the code :
- ```
fork ();
fork ();
fork ();
```
- The total number of child processes created is
- (A) 3 (B) 4  
(C) 7 (D) 8
39. Which of the following is not a web server?
- (A) Apache (B) IIS  
(C) NginX (D) Eclipse
40. Arrays with named keys are called \_\_\_\_\_ in PHP.
- (A) named arrays (B) associative arrays  
(C) keyed arrays (D) numeric arrays
41. The web server uses \_\_\_\_\_ to store client information in a web browser.
- (A) xml (B) event  
(C) cookie (D) log
42. HTML stands for :
- (A) Hyperlink Text Markup Language (B) Hyper Text Markup Language  
(C) Home Tool Markup Language (D) Home Text Markup Language
43. Choose the correct html element for the largest heading :
- (A) <h1> (B) <h6>  
(C) <head> (D) <large>

44. Which tag is used to contain javascript code?  
 (A) <js> (B) <jscript>  
 (C) <script> (D) <javascript>
45. Which is the correct declaration of a variable 'a' in javascript?  
 (A) var a; (B) variable a;  
 (C) v a; (D) varchar a;
46. Which of the following function used for the unset variables in PHP?  
 (A) delete (B) block  
 (C) unset (D) pop
47. What is the correct syntax of xml declaration?  
 (A) <?xml version = "1.0"> (B) <xml version = 1.0>  
 (C) <xml version = 1.0/> (D) <xml-version = 1.0>
48. DTD in XML stands for :  
 (A) Data Type Document (B) Document Type Definition  
 (C) Direct Type Definition (D) Data Type Definition
49. Variable name in PHP start with :  
 (A) ! (B) #  
 (C) \$ (D) %
50. Which of the following tag is used to add rows in the table?  
 (A) <th> (B) <td>  
 (C) <tr> (D) <tp>
51. To which of the following packages the Scanner class belong?  
 (A) java.io (B) java.lang  
 (C) java.awt (D) java.util
52. Which of the following methods will put the current thread on wait until the thread on which it is called is completed?  
 (A) sleep (B) join  
 (C) resume (D) suspend
53. Destructor has the same name as the constructor and it is preceded by \_\_\_\_\_ in C++ :  
 (A) \$ (B) ~  
 (C) ! (D) @
54. Which option is false about the *final* keyword?  
 (A) A final method cannot be overridden in its subclasses  
 (B) A final class cannot be extended  
 (C) A final class cannot extend other classes  
 (D) A final method can be inherited

55. Which of the following statements is/are TRUE regarding JAVA?
- (1) Static variables are called instance variables  
 (2) A class can only inherit one class but can implement multiple interfaces
- (A) only 1 is true (B) only 2 is true  
 (C) Both 1 and 2 are true (D) Neither 1 nor 2 are true
56. Which of these is a super class of all errors and exceptions in the Java language?
- (A) Throwable (B) Checked Exceptions  
 (C) Runtime Exception (D) Try
57. We can make a class abstract in C++ by :
- (A) Declaring it abstract using the final keyword  
 (B) making at least one member function as virtual function  
 (C) making at least one member function as pure virtual function  
 (D) making all member function const
58. An interface must be :
- (A) private (B) protected  
 (C) default (D) public
59. When an applet begins, the first method that is called is :
- (A) initial () (B) init ()  
 (C) run () (D) paint ()
60. When an expression consists of int, double, long, float, then the entire expression will get promoted into a data type that is :
- (A) int (B) float  
 (C) double (D) long
61. Which of the following is a stream class in java?
- (A) BitStream (B) IntStream  
 (C) ShortStream (D) ByteStream
62. Which of the following methods is used to get the priority of the thread?
- (A) getP() (B) getPrior()  
 (C) getPriority() (D) getThread()
63. Which of the following is not a set operation in SQL?
- (A) Union (B) Union all  
 (C) Minus (D) Plus
64. Which of the following is an attribute that can uniquely identify a row in a table?
- (A) tuple (B) index  
 (C) candidate key (D) none of the above

65. Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?
- (A) 2 phase locking (B) Time stamp ordering  
(C) Both (A) and (B) (D) None of the above
66. \_\_\_\_\_ is a stored procedure in database which is automatically invoked whenever a special event in the database occurs.
- (A) recovery (B) function  
(C) schedule (D) trigger
67. Which operation extracts specified columns from a table?
- (A) project (B) select  
(C) extract (D) retrieve
68. Consider a schema  $R(w, x, y, z)$  with functional dependencies  $w \twoheadrightarrow x$  and  $y \twoheadrightarrow z$ . The decomposition of  $R$  into  $R_1(w, x)$  and  $R_2(y, z)$  is :
- (A) dependency preserving but not lossless join  
(B) lossless join but not dependency preserving  
(C) dependency preserving and lossless join  
(D) neither dependency preserving nor lossless join
69. Which of the following is false in ER and relational model?
- (A) an attribute of an entity can have more than 1 value  
(B) an attribute of an entity can be composite  
(C) in a row of a relational table, an attribute can have exactly one value or a NULL value  
(D) in a row of a relational table, which is in 1NF an attribute can have more than one value
70. Consider the following schedules involving two transactions :
- S1:r1(X);r2(X);r1(Y);r2(Y);w2(Y);W1(X);  
S2:r1(X);r2(X);r2(Y);w2(Y);r1(Y);w1(X);
- Which one of the following statements is true?
- (A) Both S1 and S2 are not conflict serializable  
(B) Both S1 and S2 are conflict serializable  
(C) Only S1 is conflict serializable  
(D) Only S2 is conflict serializable
71. Which of the following is true?
- (A) every relation is 3NF is in BCNF  
(B) lossless dependency preserving decomposition into BCNF is always possible  
(C) a relation with two attributes is in BCNF  
(D) no relation can be in both BCNF and 3NF

72. Number of tuples in a relation is referred to as :
- (A) attributes (B) keys  
(C) entity (D) cardinality
73. Which of the following is NOT part of ACID properties of database transaction?
- (A) Atomicity (B) Consistency  
(C) Interdependance (D) Durability
74. Which of the following is not an aggregate function in SQL?
- (A) Avg() (B) Max()  
(C) Count() (D) Add()
75. Which of the following is not a function of data link layer?
- (A) Routing (B) Flow Control  
(C) Error Control (D) Framing
76. How long does it take to transmit an uncompressed image that is  $4000 \times 3000$  pixels with 3 bytes/pixel over 100 Mbps Ethernet?
- (A) 120 sec (B) 2.880 sec  
(C) 120 msec (D) 2880 sec
77. What is the maximum bit rate possible in a noiseless channel with a bandwidth of 2500 Hz transmitting signals with four signal levels?
- (A) 25 kbps (B) 5 kbps  
(C) 10 kbps (D) 1 kbps
78. \_\_\_\_\_ is the standard for token bus.
- (A) IEEE 802.3 (B) IEEE 802.11  
(C) IEEE 802.5 (D) IEEE 802.4
79. Slow convergence problem occurs in :
- (A) RIP (B) OSPF  
(C) CSMA (D) SMTP
80. \_\_\_\_\_ is a connection oriented reliable protocol.
- (A) UDP (B) TCP  
(C) IP (D) ICMP
81. DNS is used to convert domain name into :
- (A) MAC address (B) Multicast address  
(C) IP address (D) Port address
82. What is the port number used by SMTP?
- (A) 21 (B) 20  
(C) 80 (D) 25

83. In RSA cryptosystem the sender A uses two prime numbers  $p = 3$  and  $q = 11$  to generate public and private keys. If the public key of A is 7, what is the private key of A?
- (A) 3 (B) 7  
(C) 13 (D) 11
84. \_\_\_\_\_ is a network authentication protocol.
- (A) RSA (B) Kerberos  
(C) DES (D) DHCP
85. In RMI, the process of passing parameters to a remote method from client to server and vice-versa is called :
- (A) Encryption and Decryption  
(B) Multiplexing and Demultiplexing  
(C) Marshalling and Unmarshalling  
(D) Uploading and Downloading
86. UDDI stands for :
- (A) Uniform Distributed Directory and Integration  
(B) Universal Distributed Directory and Integration  
(C) Uniform Description Discovery and Integration  
(D) Universal Description Discovery and Integration
87. In a \_\_\_\_\_ HTTP connection, a single TCP connection is used to send and receive multiple HTTP requests/responses.
- (A) Persistent (B) Non Persistent  
(C) Both (A) and (B) (D) None of the above
88. The encryption protocol used by HTTPS :
- (A) SHA (B) TLS  
(C) IMAP (D) POP3
89. \_\_\_\_\_ is an evolutionary software process model that couples the iterative nature of proto-typing with the controlled and systematic aspects of the waterfall model.
- (A) Spiral Model (B) V Model  
(C) Incremental Model (D) None of the above
90. In the context of an integration test strategy, \_\_\_\_\_ is the re execution of some subset of tests that have already been conducted to ensure that changes have not propagated unintended side effects.
- (A) Smoke Testing (B) Regression Testing  
(C) Stress Testing (D) Configuration Testing
91. The \_\_\_\_\_ model indicates how software will respond the external events or stimuli.
- (A) System (B) Context  
(C) Behaviour (D) Data

92. \_\_\_\_\_ is a system whose operation is degraded if results are not produced according to the specified timing requirements.
- (A) Embedded system (B) Distributed system  
(C) Hard real time system (D) Soft real time system
93. \_\_\_\_\_ is an example of safety-critical system.
- (A) Insulin Pump  
(B) Spacecraft navigation system  
(C) Online money transfer system  
(D) Online gaming
94. Risk-driven specification is an approach that has been widely used by \_\_\_\_\_ developers.
- (A) Operating system  
(B) Critical system  
(C) Database Management system  
(D) None of the above
95. Boundary value analysis is a test case design strategy used in :
- (A) Glass Box Testing (B) White Box Testing  
(C) Black Box Testing (D) Manual Testing
96. The feature of object oriented design that enables code reusability is :
- (A) Encapsulation (B) Polymorphism  
(C) Abstraction (D) Inheritance
97. UML stands for :
- (A) Unified Modeling Language (B) Unified Markup Language  
(C) Uniform Modeling Language (D) Uniform Markup Language
98. \_\_\_\_\_ are used to model a system's behavior in response to internal to external events.
- (A) Use case diagram (B) State diagram  
(C) Activity diagram (D) Timing diagram
99. The SRS document is often termed as :
- (A) Use case specification (B) Prototype specification  
(C) Black box specification (D) White box specification
100. \_\_\_\_\_ is a working model of the system that is developed to test the concepts and assumptions about the system.
- (A) V-model (B) DFD  
(C) E-R model (D) Prototype
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