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A

SET-Y

Ph.D./URS-EE-Jan-2022

SUBJECT : Computer Science

Sr. No. 10001

Time : 1¼ Hours | Max. Marks : 100 | Total Questions : 100

Roll No. (in figures)_____ (in words) _____

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SEAL

1. How is a J-K Flip Flop made to toggle ?
   (1) J = 0, K = 0 (2) J = 1, K = 0
   (3) J = 0, K = 1 (4) J = 1, K = 1

2. In which OSI layers does the FDDI protocol operate ?
   (I) Physical (II) Data link
   (III) Network
   (1) I and II (2) II and III
   (3) I and III (4) None

3. Number of flip-flops used in decade counter :
   (1) 3 (2) 2
   (3) 4 (4) None of these

4. The Octal number equivalent of the decimal number 489 is :
   (1) 750 (2) 752
   (3) 329 (4) 751

5. If the size of the stack is 10 and we try to add the 11th element in the stack then the condition is known as :
   (1) Underflow (2) Garbage collection
   (3) Overflow (4) None

6. Your router has the following IP address on Ethernet : 172.16.2.1/23. Which of the following can be valid host IDs on the LAN interface attached to the router ?
   (i) 172.16.1.100 (ii) 172.16.1.198 (iii) 172.16.2.255 (iv) 172.16.3.0
   (1) (i) only (2) (ii) and (iii) only
   (3) (iii) and (iv) only (4) None of these

7. If the baud rate is 400 for a 4-PSK signal, the bit rate is ..... bps.
   (1) 1600 (2) 800
   (3) 400 (4) 100

8. A binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called ..... .

(1) Lemma tree
(2) Red Black tree
(3) AVL tree
(4) None of the above

9. What will be the output of the following C code' ?

```
#include <stdio.h>

int main( )

{ int const a = 5;

a++;

printf("%d" ,a);

}
```

(1) 5
(2) 6
(3) Compile time error
(4) Runtime error

10. Which of the following option is ***not*** correct ?

(1) If the queue is implemented with a linked list, keeping track of a front pointer, Only rear pointers will change during an insertion into an non-empty queue.
(2) Queue data structure can be used to implement least recently used (LRU) page fault algorithm and Quick short algorithm.
(3) Queue data structure can be used to implement Quick short algorithm but not least recently used (LRU) page fault algorithm.
(4) Both (1) and (3)

11. The best data structure to check whether an arithmetic expression has balanced parentheses is a :

(1) stack
(2) queue
(3) tree
(4) list

12. In inheritance, order of execution of base class and derived class destructors are :

(1) Base to derived (2) Derived to base

(3) Random order (4) none

13. What logic function is obtained by adding an inverter to the inputs of an OR gate ?

(1) OR (2) NAND

(3) XOR (4) NOR

14. A C program contains the following declaration :

static int X{8) = { 10, 20, 30, 40, 50, 60, 70, 80}

What are the values of (*X +2) and *(X+ 2) ?

(1) 10, 30 (2) 10, 32

(3) 30, 12 (4) 12, 30

15. Which of the application layer loT Protocols uses telemetry communication pattern ?

(1) COAP (2) MQTT

(3) AMQP (4) None of the above

16. Suppose V is a signed 16-bit integer with hexadecimal value 0 × 369C. What will be the result of V<<4 ?

(1) 0 × 669C (2) 0 × 69C0

(3) 0 × 0369 (4) None of the above

17. A computer has five resources, with n processes competing for them. Each process may need two resources. What is the maximum value of n for the system to be deadlock free ?

(1) 5 (2) 4

(3) 3 (4) 2

18. Which of the following condition is required for a deadlock to be possible ?

(1) mutual exclusion

(2) a process may hold allocated resources while awaiting assignment of other resources

(3) no resource can be forcibly removed from a process holding it

(4) all of the mentioned

19. Let G be a simple undirected planar graph of 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to :

(1) 6 (2) 5

(3) 4 (4) 3

20. $(p \rightarrow r) \vee (q \rightarrow r)$ is logically equivalent to :

(1) $(p \wedge q) \vee r$ (2) $(p \vee q) \rightarrow r$

(3) $(p \wedge q) \rightarrow r$ (4) $(p \rightarrow q) \rightarrow r$

21. What must be the base of the number, if expression 4 +2 =11 is true ?

(1) 7 (2) 6

(3) 5 (4) 4

22. ..... input values will cause an AND logic gate to produce a HIGH output.

(1) At least one input is HIGH (2) At least one input is LOW

(3) All inputs are LOW (4) All inputs are HIGH

23. Which of the following set of gates can be used in a Full-Adder ?

(1) Two half-adders and one OR gate

(2) Two OR gates and one half-adder

(3) One half-adder and two OR gates

(4) One OR gate and one half-adder

24. Which of the following pairs have different expressive power ?

(1) Deterministic finite automata(DFA) and Non-deterministic finite automata (NFA)

(2) Deterministic push down automata(DPDA)and Non-deterministic push down automata(NPDA)

(3) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine

(4) Single-tape Turing machine and multi-tape Turing machine

25. A combinational logic circuit which is used when it is desired to send data from two or more source through a single transmission line is known as :

(1) encoder (2) decoder

(3) multiplexer (4) demultiplexer

26. Which one of the following RAID levels provides the maximum reliability of data storage ?

(1) RAID 10 (2) RAID 4

(3) RAID 5 (4) RAID 6

27. How long is an IPv4 and IPv6 address respectively ?

(1) 64 bits, 32 bits (2) 32bits, 64 bits

(3) 128bits, 32 bits (4) 32 bits, 128 bits

28. Which binary number represents 2' complement of the Hexadecimal number DEAF ?

(1) 0010 0001 0101 0111 (2) 1101 1110 1010 1111

(3) 0010 0001 0101 0011 (4) 0010 0001 0101 0001

29. Which of the following services use TCP ?

(i) DHCP (ii) SMTP (iii) HTTP (iv) TFTP (v) FTP

(1) (i) and (ii) (2) (ii), (iii) and (v)

(3) (i), (ii) and (iv) (4) (i), (iii) and (iv)

30. Identify the ***correct*** statement about the application of XML ?
(1) XML must be used to produce XML and HTML output.
(2) XML can not specify or contain presentation information
(3) XML is used to describe hierarchically organized information.
(4) XML performs the conversion of information between different e-business applications.

31. The web browser request goes to the server in :
(1) Hex form
(2) ASCII form
(3) Binary form
(4) Text form

32. What does error 404 or Not Found error while accessing a URL mean ?
(1) The server could not find the requested URL
(2) Requested HTML file is not available
(3) The path to the interpreter of the script is not valid
(4) The requested HTML file does not have sufficient permissions

33. Which of the following can be used to store 1 bit of data ?
(1) Encoder
(2) OR gate
(3) Flip-Flop
(4) Decoder

34. Which one of the following about the MIPS rating of a computer is FALSE ?
(1) MIPS rating of a computer depends on the compiler being used
(2) MIPS rating of a processor is independent of the Program is being executed
(3) MIPS rating of a computer can vary based on which instructions of a processor are being considered.
(4) MIPS rating of a computer depends upon the clock rate of the processor

35. The interval from the time of submission of a process to the time of completion is termed as :
(1) waiting time
(2) turn around time
(3) response time
(4) throughput

36. In FTP protocol, client contacts server using ..... as the transport protocol.

(1) transmission control protocol

(2) user datagram protocol

(3) datagram congestion control protocol

(4) stream control transmission protocol

37. Which of the following would cause the Page Fault frequency in an operating system to reduce ?

(1) Cache memory size is increased

(2) Size of pages is reduced

(3) Executing processes remain CPU bound

(4) Executing processes exhibit high locality of reference

38. The technique of memory compaction and reuse of memory can be applied to overcome the problem of :

(1) External fragmentation

(2) Internal Fragmentation

(3) Page Fault

(4) Swapping

39. For a 10 Mbps Ethernet link, if the length of the packet is 32 bits, the transmission delay is ..... (in microseconds).

(1) 3.2

(2) 32

(3) 0.32

(4) 320

40. In a compiler, keywords of a language are recognized during ..... .

(1) the code generation

(2) the lexical analysis of the program

(3) parsing of the program

(4) data flow analysis

41. The set { 1, 2, 4, 7, 8,11,13, 14} is a group under multiplication modulo 15. The inverses of 4 and 7 are respectively :

(1) 3 and 13

(2) 2 and 11

(3) 4 and 13

(4) 8 and 14

42. Thread synchronization is required because :

(1) all threads of a process share the same address space

(2) all threads of a process share the same global variables

(3) all threads of a process can share the same files

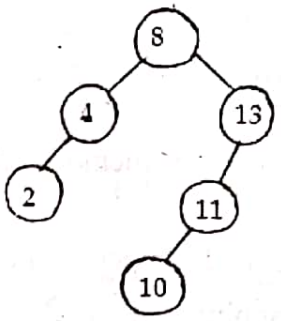
(4) all of the mentioned

43. In the transfer of file between server and client, if the transmission rates along the path is10 Mbps, 20 Mbps, 30 Mbps, 40 Mbps. The throughput is usually :

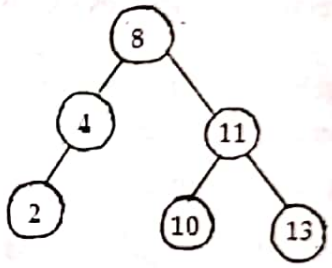
(1) 10 Mbps (2) 20 Mbps

(3) 40 Mbps (4) 50 Mbps

44. Which of the below diagram is following AVL tree property ?



(i)



(ii)

(1) only i (2) only ii

(3) Both i and ii (4) i is not a binary search tree

45. A connected planar graph having 6 vertices, 7 edges contains ..... regions.

(1) 15 (2) 3

(3) 1 (4) 11

46. Which of the following statements are ***correct*** ?

Sl : {02n |n >= 1} is a regular language

S2 : {0m 0n 0(m+n) Im > = 1 and n > = 2} is a regular language

(1) S2 Only (2) S1 Only

(3) Both Sl and S2 (4) None of S1 and S2 is correct

47. Which one of the following statements is NOT correct about the B+ tree data structure used for creating an index of a relational database table ?

(1) Each leaf node has a pointer to the next leaf node

(2) Non-leaf nodes have pointers to data records

(3) B+ Tree is a height-balanced tree

(4) Key values in each node are kept in sorted order

48. The Viewing plane or the projector is set up in which of the following position ?

(1) Perpendicular to x and aligned with y, z

(2) Perpendicular to y and aligned with x, z

(3) At origin

(4) Perpendicular to z and aligned with x, y

49. What is the file size of a 640 by 480 pictures of 256 colours in a 8- bit resolution ?

(1) 128 KB (2) 300 KB

(3) 900 KB (4) 1024 KB

50. Which of the following is TRUE ?

(1) Every relation in 3NF is also in BCNF

(2) A relation R is in 3NF if every non prime attribute of R is fully functionally dependent on every key of R

(3) Every relation in BCNF is also in 3NF

(4) No relation can be in both BCNF and 3NF

51. Which transformation distorts the shape of an object such that the transformed shape appears as if the object were composed of internal layers that had been caused to slide over each other ?

(1) Rotation (2) Scaling up

(3) Scaling down (4) Shearing

52. Which of the following type of perspective projection is used in drawings of railway lines ?

(1) Three-point

(2) Two-point

(3) One-point

(4) Perspective projection is not used to draw railway lines

53. After performing Y-shear transformation on triangle we get A(2,5),B(4,11),C(2,7). If the constant value is 2, then original coordinates will be :

(1) A(2, 5), B(4, 11),C(2, 7)

(2) A(2, 1), B(4, 3),C(2, 3)

(3) A(4, 1), B(10,3), C{4, 3)

(4) A(5, 11), B(3, 4),C(3, 2)

54. In the context of modular software design, which one of the following combinations is desirable :

(1) High cohesion and high coupling

(2) High cohesion and low coupling

(3) Low cohesion and high coupling

(4) Low cohesion and low coupling

55. GSM is an example of :

(1) TDMA cellular systems

(2) FDMA cellular systems

(3) CDMA cellular systems

(4) SDMA cellular systems

56. A key concept of quality control is that all work products :

(1) Are delivered on time and under budget

(2) Have complete documentation

(3) Have measurable specifications for process outputs

(4) Are thoroughly tested before delivery to the customer

57. The theoretic concept that will be useful in software testing is :

(1) Hamiltonian circuit

(2) Cyclomatic number

(3) Eulerian Cycle

(4) None of these

58. Which is not a task of software Configuration Management ?

(1) Version control

(2) Reporting

(3) Change management

(4) Ouality control

59. The requirement analysis is performed in :

(1) System design phase
(2) System development phase
(3) System analysis phase
(4) System testing phase

60. Consider the following C code. Assume that unsigned long int type length is 64 bits.

```
unsigned long int fun(unsigned long int n) {
unsigned long int i, j, j=0, sum = 0;
for (i = n; i > 1; i = i/2) j++;
for ( ; j > 1; j = j/2) sum++;
return sum;
}
```

The value returned when we call fun with the input 2^{40} is :

(1) 4
(2) 5
(3) 6
(4) 40

61. Which search is similar to minimax search ?

(1) Hill-climbing search
(2) Depth-first search
(3) Breadth-first search
(4) All of these

62. Which of the following can be identified as the cloud ?

(1) Intranet
(2) Hadoop
(3) Web applications
(4) All of the above

63. In which ANN, loops are allowed ?

(1) FeedForward ANN
(2) FeedBack ANN
(3) Both (1) and (2)
(4) None of the Above

64. Choose the best matching between the Group 1 and their characteristics in Group 2.

	Group – 1		Group – 2
P	Regular expression	1.	Syntax analysis
Q	Pushdown automata	2.	Code generation
R	Dutaflow analysis	3.	Lexical analysis
S	Register allocation	4.	Code optimization

(1) P-3, Q-2, R-1, S-4 (2) P-3, Q-1, R-4, S-2

(3) P-4, Q-2, R-1, S-3 (4) P-1, Q-2, R-3, S-4

65. The total number of states required to automate the given regular expression(00)*(11)*

(1) 3 (2) 4

(3) 5 (4) 6

66. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals{S, A} and terminals {a, b}}.

S → aA {{Print 1}

S → a {Print 2}

A → Sb {Print 3}

(1) 1 3 2 (2) 2 2 3

(3) 2 3 1 (4) Syntax error

67. Which of the following is ***not*** a horn clause ?

(1) p (2) $\phi p \vee q$

(3) $p \rightarrow q$ (4) $p \rightarrow \phi q$

68. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case ?

(1) Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)

(2) Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)

(3) Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)

(4) Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

69. How many states of a DFA can be converted from an NFA with n states ?

(1) n (2) n2

(3) 2n (4) None of these

70. Consider the intermediate code given below :

1. i = 1
2. j = 1
3. t1=5*i
4. t2 = t1 + j
5. t3 = 4 * t2
6. t4 = t3
7. a[t4] = – 1
8. j = j + 1
9. if j <= 5 goto(3)
10. i = i + 1
11. if i < 5 goto(2)

The number of nodes and edges in the control-flow-graph constructed for the above code, respectively, are :

(1) 5 and 7 (2) 6 and 7

(3) 5 and 5 (4) 7 and 8

71. Consider the 3 processes, P1, P2 and P3 shown in the table :

Process	Arrival time	Time Units Required
P1	0	5
P2	1	7
P3	3	4

The completion order of the 3 processes under the policies FCFS and RR2 (round robin scheduling with CPU quantum of 2 time units) are

(1) FCFS : P1, P2, P3 RR2 : P1, P2, P3

(2) FCFS : P1, P3, P2 RR2 : P1, P3, P2

(3) FCFS : P1, P2, P3 RR2 : P1, P3, P2

(4) FCFS : P1, P3, P2 RR2 : P1, P2, P3

72. Consider a system with byte-addressable memory, 32 bit logical addresses, 4 kilobyte page size and page table entries of 4 bytes each. What is the size of the page table in the system ?

(1) 4 Megabyte

(2) 4 Kilobyte

(3) 2 Megabyte

(4) 2 Kilobyte

73. A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements :

P : Increasing the number of page frames allocated to a process sometimes increases the page fault rate.

Q : Some programs do not exhibit locality of reference.

Which one of the following is TRUE ?

(1) Both P and Q are true, and Q is the reason for P

(2) Both P and Q are true, but Q is not the reason for P.

(3) P is false, but Q is true

(4) Both P and Q are false

74. On a system using fixed partitions, all of size 2^8, the number of bits used by the limit register is :

(1) 8 (2) 64

(3) 127 (4) 256

75. Consider a disk drive with 16 surfaces, 512 tracks/surface, 512 sectors/track, 1 KB/sector, rotation speed 3000 rpm. The disk is operated in cycle stealing mode whereby whenever one byte word is ready it is sent to memory; similarly, for writing, the disk interface reads a 4 byte word from the memory in each DMA cycle. Memory cycle time is 40 nsec. The maximum percentage of time that the CPU gets blocked during DMA operation is :

(1) 10 (2) 25

(3) 40 (4) 50

76. G is a graph on n vertices and 2n–2 edges. The edges of G can be partitioned into two edge-disjoint spanning trees. Which of the following is NOT true for G ?

(1) For every subset of k vertices, the induced subgraph has at most 2k-2 edges

(2) The minimum cut in G has at least two edges

(3) There are two edge-disjoint paths between every pair to vertices

(4) There are two vertex-disjoint paths between every pair of vertices

77. In AI, the problem space of means-end analysis has :

(1) An initial state and one or more goal states

(2) One or more initial states and one goal state

(3) One or more initial states and one or more goal state

(4) One initial state and one goal state

78. If A and B are two fuzzy sets with membership functions : $\mu_a(\chi)$ ={0.2, 0.5., 0.6, 0.1, 0.9} , $\mu_b(\chi)$= {0.1 ,0.5,0.2,0.7,0.8}, then the value of $\mu_a \cup \mu_b$ will be :

(1) {0.2,0.5,0.6,0.7,0.9}

(2) {0.2, 0.5,0.2, 0.1,0.8}

(3) {0.1, 0.5, 0.6, 0.1, 0.8}

(4) {0.1, 0.5, 0.2, 0.1,0.8}

79. Which of the following is ***correct*** for the neural network ?

I The training time is dependent on the size of the network

II Neural networks can be simulated on the conventional computers

III Artificial neurons are identical in operation to a biological one

(1) I is true
(2) II is true
(3) I and II are true
(4) All of the above

80. A ..... begins by hypothesizing a sentence (the symbol S) and successively predicting lower level constituents until individual pre-terminal symbols are written.

(1) bottom-up parser
(2) top parser
(3) top-down parser
(4) bottom parser

81. Which one of the following is NOT desired in a good Software Requirement Specifications(SRS) document ?

(1) Functional Requirements
(2) Non-Functional Requirements
(3) Goals of Implementation
(4) Algorithms for Software Implementation

82. Which of the following is a widely used and effective machine learning algorithm based on the idea of bagging ?

(1) Decision Tree
(2) Regression
(3) Classification
(4) Random Forest

83. The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are :

(1) TCP, UDP, UDP and TCP

(2) UDP, TCP, TCP and UDP

(3) UDP, TCP, UDP and TCP

(4) TCP, UDP, TCP and UDP

84. Which of the following protocols is used to map MAC address to IP address ?

(1) ARP (2) RAPP

(3) DNS (4) None of the above

85. Packets of the same session may be routed through different paths in :

(1) TCP, but not UDP (2) UDP, but not TCP

(3) TCP and UDP (4) Neither TCP, nor UDP

86. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

(1) Network layer – 4 times and Data link layer – 4 times

(2) Network layer – 4 times and Data link layer – 6 times

(3) Network layer – 2 times and Data link layer – 6 times

(4) None of the above

87. Which of the following is/are example(s) of stateful application layer protocols ?

(i) HTTP (ii) FTP

(iii) TCP (iv) POP3

(1) (i) and (ii) only (2) (ii) and (iii) only

(3) (ii) and (iv) only (4) (iv) only

88. In project 802, the data link layer consists of the ..... sublayer and the ..... sublayer.

(1) LAN, MAC (2) LLC, MAC

(3) CSMA, LLC (4) LLC, PDU

89. If subnet addresses are 129.253.4.0,129.253.8.0,129.253.12.0 and 129.253.16.0 What is the subnet mask ?

(1) 129.253.7.0 (2) 129.253.31.0

(3) 129.253.192.0 (4) 129.253.252.0

90. What is the standard length of MAC address ?

(1) 16bits (2) 32 bits

(3) 48 bits (4) 64 bits

91. Which of the following problems is NOT NP-hard ?

(1) Hamiltonian circuit problem (2) The 0/1 Knapsack Problem

(3) The graph colouring problem (4) None of these

92. PGP encrypts data by using a block cipher called :

(1) International data encryption algorithm

(2) Private data encryption algorithm

(3) Internet data encryption algorithm

(4) Local data encryption algorithm

93. The following numbers are inserted into an empty binary search tree in the given order : 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree ?

(1) 2 (2) 3

(3) 4 (4) 6

94. Correct statements about static function in C++ code are :

(I) Static function of a class can be called by class name using scope resolution operator i.e.

(II) Static function can receive both static and non-static data members of a class

(III) Static function is not the part of an object of a class

(1) I and II (2) I only

(3) I and III (4) I, II and III

95. Consider the function f defined below :

```
struct item
{
int data;
struct item * next;
};
int f(struct item *p)
{
return (
    (p == NULL) ||
    (p->next == NULL) ||
    (( P->data <= p->next->data) && f(p->next))
    );
}
```

For a given linked list p, the function f returns 1 if and only if :

(1) the list is empty or has exactly one element

(2) the elements in the list are sorted in non-decreasing order of data value

(3) the elements in the list are sorted in non-increasing order of data value

(4) not all elements in the list have the same data value

96. What is the purpose of bin directory in Linux environment ?

(1) Contains essential device files

(2) Contains essential binary commands

(3) Containing configuration files

(4) Contains user home directories

97. The maximum number of nodes in a tree for which post-order and pre-order traversals may be equal is :

(1) 1

(2) 2

(3) 3

(4) any number

98. In a C programming language $x -= y + 1$ means :

(1) $x = -x - y - 1$

(2) $x = x - y + 1$

(3) $x = x - y - 1$

(4) $x = -x + y + 1$

99. A 4-input neuron has weights 1, 2, 3, and 4. The transfer function is linear, with the constant of proportionality being equal to 2. The inputs are 4,10,5, and 20 respectively. The output will be :

(1) 76

(2) 238

(3) 123

(4) 119

100. C++ abstract class can contain :

(1) Pure virtual function

(2) Non-virtual function

(3) Only pure virtual function

(4) Both pure virtual and non-virtual function

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B

SET-Y

Ph.D./URS-EE-Jan-2022

SUBJECT : Computer Science

10022

Sr. No. .....

Time : 1¼ Hours | Max. Marks : 100 | Total Questions : 100

Roll No. (in figures)_____ (in words) _____

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1. The best data structure to check whether an arithmetic expression has balanced parentheses is a :

   (1) stack (2) queue

   (3) tree (4) list

2. In inheritance, order of execution of base class and derived class destructors are :

   (1) Base to derived (2) Derived to base

   (3) Random order (4) none

3. What logic function is obtained by adding an inverter to the inputs of an OR gate ?

   (1) OR (2) NAND

   (3) XOR (4) NOR

4. A C program contains the following declaration :

   static int X{8) = { 10, 20, 30, 40, 50, 60, 70, 80}

   What are the values of (*X +2) and *(X+ 2) ?

   (1) 10, 30 (2) 10, 32

   (3) 30, 12 (4) 12, 30

5. Which of the application layer loT Protocols uses telemetry communication pattern ?

   (1) COAP (2) MQTT

   (3) AMQP (4) None of the above

6. Suppose V is a signed 16-bit integer with hexadecimal value 0 × 369C. What will be the result of V<<4 ?

   (1) 0 × 669C (2) 0 × 69C0

   (3) 0 × 0369 (4) None of the above

7. A computer has five resources, with n processes competing for them. Each process may need two resources. What is the maximum value of n for the system to be deadlock free ?

(1) 5 (2) 4

(3) 3 (4) 2

8. Which of the following condition is required for a deadlock to be possible ?

(1) mutual exclusion

(2) a process may hold allocated resources while awaiting assignment of other resources

(3) no resource can be forcibly removed from a process holding it

(4) all of the mentioned

9. Let G be a simple undirected planar graph of 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to :

(1) 6 (2) 5

(3) 4 (4) 3

10. $(p \rightarrow r) \vee (q \rightarrow r)$ is logically equivalent to :

(1) $(p \wedge q) \vee r$ (2) $(p \vee q) \rightarrow r$

(3) $(p \wedge q) \rightarrow r$ (4) $(p \rightarrow q) \rightarrow r$

11. Which of the following problems is NOT NP-hard ?

(1) Hamiltonian circuit problem (2) The 0/1 Knapsack Problem

(3) The graph colouring problem (4) None of these

12. PGP encrypts data by using a block cipher called :

(1) International data encryption algorithm

(2) Private data encryption algorithm

(3) Internet data encryption algorithm

(4) Local data encryption algorithm

13. The following numbers are inserted into an empty binary search tree in the given order : 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree ?

(1) 2 (2) 3

(3) 4 (4) 6

14. Correct statements about static function in C++ code are :

(I) Static function of a class can be called by class name using scope resolution operator i.e.

(II) Static function can receive both static and non-static data members of a class

(III) Static function is not the part of an object of a class

(1) I and II (2) I only

(3) I and III (4) I, II and III

15. Consider the function f defined below :

```
struct item
{
int data;
struct item * next;
};
int f(struct item *p)
{
return (
    (p == NULL) ||
    (p->next == NULL) ||
    (( P->data <= p->next->data) && f(p->next))
    );
}
```

For a given linked list p, the function f returns 1 if and only if :

(1) the list is empty or has exactly one element

(2) the elements in the list are sorted in non-decreasing order of data value

(3) the elements in the list are sorted in non-increasing order of data value

(4) not all elements in the list have the same data value

16. What is the purpose of bin directory in Linux environment ?

(1) Contains essential device files
(2) Contains essential binary commands
(3) Containing configuration files
(4) Contains user home directories

17. The maximum number of nodes in a tree for which post-order and pre-order traversals may be equal is :

(1) 1
(2) 2
(3) 3
(4) any number

18. In a C programming language $x - = y + 1$ means :

(1) $x = -x - y - 1$
(2) $x = x - y + 1$
(3) $x = x - y - 1$
(4) $x = -x + y + 1$

19. A 4-input neuron has weights 1, 2, 3, and 4. The transfer function is linear, with the constant of proportionality being equal to 2. The inputs are 4,10,5, and 20 respectively. The output will be :

(1) 76
(2) 238
(3) 123
(4) 119

20. C++ abstract class can contain :

(1) Pure virtual function
(2) Non-virtual function
(3) Only pure virtual function
(4) Both pure virtual and non-virtual function

21. Consider the 3 processes, P1, P2 and P3 shown in the table :

Process	Arrival time	Time Units Required
P1	0	5
P2	1	7
P3	3	4

The completion order of the 3 processes under the policies FCFS and RR2 (round robin scheduling with CPU quantum of 2 time units) are

(1) FCFS : P1, P2, P3 RR2 : P1, P2, P3
(2) FCFS : P1, P3, P2 RR2 : P1, P3, P2
(3) FCFS : P1, P2, P3 RR2 : P1, P3, P2
(4) FCFS : P1, P3, P2 RR2 : P1, P2, P3

22. Consider a system with byte-addressable memory, 32 bit logical addresses, 4 kilobyte page size and page table entries of 4 bytes each. What is the size of the page table in the system ?

(1) 4 Megabyte (2) 4 Kilobyte

(3) 2 Megabyte (4) 2 Kilobyte

23. A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements :

P : Increasing the number of page frames allocated to a process sometimes increases the page fault rate.

Q : Some programs do not exhibit locality of reference.

Which one of the following is TRUE ?

(1) Both P and Q are true, and Q is the reason for P

(2) Both P and Q are true, but Q is not the reason for P.

(3) P is false, but Q is true

(4) Both P and Q are false

24. On a system using fixed partitions, all of size 2^8, the number of bits used by the limit register is :

(1) 8 (2) 64

(3) 127 (4) 256

25. Consider a disk drive with 16 surfaces, 512 tracks/surface, 512 sectors/track, 1 KB/sector, rotation speed 3000 rpm. The disk is operated in cycle stealing mode whereby whenever one byte word is ready it is sent to memory; similarly, for writing, the disk interface reads a 4 byte word from the memory in each DMA cycle. Memory cycle time is 40 nsec. The maximum percentage of time that the CPU gets blocked during DMA operation is :

(1) 10 (2) 25

(3) 40 (4) 50

26. G is a graph on n vertices and 2n–2 edges. The edges of G can be partitioned into two edge-disjoint spanning trees. Which of the following is NOT true for G ?

(1) For every subset of k vertices, the induced subgraph has at most 2k-2 edges

(2) The minimum cut in G has at least two edges

(3) There are two edge-disjoint paths between every pair to vertices

(4) There are two vertex-disjoint paths between every pair of vertices

27. In Al, the problem space of means-end analysis has :

(1) An initial state and one or more goal states

(2) One or more initial states and one goal state

(3) One or more initial states and one or more goal state

(4) One initial state and one goal state

28. If A and B are two fuzzy sets with membership functions : $\mu_a(\chi)$ ={0.2, 0.5., 0.6, 0.1, 0.9} , $\mu_b(\chi)$= {0.1 ,0.5,0.2,0.7,0.8}, then the value of $\mu_a \cup \mu_b$ will be :

(1) {0.2,0.5,0.6,0.7,0.9}

(2) {0.2, 0.5,0.2, 0.l,0.8}

(3) {0.l, 0.5, 0.6, 0.l, 0.8}

(4) {0.1, 0.5, 0.2, 0.1,0.8}

29. Which of the following is ***correct*** for the neural network ?

I The training time is dependent on the size of the network

II Neural networks can be simulated on the conventional computers

III Artificial neurons are identical in operation to a biological one

(1) I is true (2) II is true

(3) I and II are true (4) All of the above

30. A ..... begins by hypothesizing a sentence (the symbol S) and successively predicting lower level constituents until individual pre-terminal symbols are written.

(1) bottom-up parser (2) top parser

(3) top-down parser (4) bottom parser

31. Which transformation distorts the shape of an object such that the transformed shape appears as if the object were composed of internal layers that had been caused to slide over each other ?

(1) Rotation
(2) Scaling up
(3) Scaling down
(4) Shearing

32. Which of the following type of perspective projection is used in drawings of railway lines ?

(1) Three-point
(2) Two-point
(3) One-point
(4) Perspective projection is not used to draw railway lines

33. After performing Y-shear transformation on triangle we get A(2,5),B(4,11),C(2,7). If the constant value is 2, then original coordinates will be :

(1) A(2, 5), B(4, 11),C(2, 7)
(2) A(2, 1), B(4, 3),C(2, 3)
(3) A(4, 1), B(10,3), C{4, 3)
(4) A(5, 11), B(3, 4),C(3, 2)

34. In the context of modular software design, which one of the following combinations is desirable :

(1) High cohesion and high coupling
(2) High cohesion and low coupling
(3) Low cohesion and high coupling
(4) Low cohesion and low coupling

35. GSM is an example of :

(1) TDMA cellular systems
(2) FDMA cellular systems
(3) CDMA cellular systems
(4) SDMA cellular systems

36. A key concept of quality control is that all work products :

(1) Are delivered on time and under budget
(2) Have complete documentation
(3) Have measurable specifications for process outputs
(4) Are thoroughly tested before delivery to the customer

37. The theoretic concept that will be useful in software testing is :

(1) Hamiltonian circuit
(2) Cyclomatic number
(3) Eulerian Cycle
(4) None of these

38. Which is not a task of software Configuration Management ?

(1) Version control
(2) Reporting
(3) Change management
(4) Ouality control

39. The requirement analysis is performed in :

(1) System design phase
(2) System development phase
(3) System analysis phase
(4) System testing phase

40. Consider the following C code. Assume that unsigned long int type length is 64 bits.

```
unsigned long int fun(unsigned long int n) {
unsigned long int i, j, j=0, sum = 0;
for (i = n; i > 1; i = i/2) j++;
for ( ; j > 1; j = j/2) sum++;
return sum;
}
```

The value returned when we call fun with the input 2^{40} is :

(1) 4
(2) 5
(3) 6
(4) 40

41. The web browser request goes to the server in :

(1) Hex form
(2) ASCII form
(3) Binary form
(4) Text form

42. What does error 404 or Not Found error while accessing a URL mean ?

(1) The server could not find the requested URL
(2) Requested HTML file is not available
(3) The path to the interpreter of the script is not valid
(4) The requested HTML file does not have sufficient permissions

43. Which of the following can be used to store 1 bit of data ?

(1) Encoder
(2) OR gate
(3) Flip-Flop
(4) Decoder

44. Which one of the following about the MIPS rating of a computer is FALSE ?

(1) MIPS rating of a computer depends on the compiler being used
(2) MIPS rating of a processor is independent of the Program is being executed
(3) MIPS rating of a computer can vary based on which instructions of a processor are being considered.
(4) MIPS rating of a computer depends upon the clock rate of the processor

45. The interval from the time of submission of a process to the time of completion is termed as :

(1) waiting time
(2) turn around time
(3) response time
(4) throughput

46. In FTP protocol, client contacts server using ..... as the transport protocol.

(1) transmission control protocol
(2) user datagram protocol
(3) datagram congestion control protocol
(4) stream control transmission protocol

47. Which of the following would cause the Page Fault frequency in an operating system to reduce ?

(1) Cache memory size is increased
(2) Size of pages is reduced
(3) Executing processes remain CPU bound
(4) Executing processes exhibit high locality of reference

48. The technique of memory compaction and reuse of memory can be applied to overcome the problem of :

(1) External fragmentation
(2) Internal Fragmentation
(3) Page Fault
(4) Swapping

49. For a 10 Mbps Ethernet link, if the length of the packet is 32 bits, the transmission delay is ..... (in microseconds).

(1) 3.2
(2) 32
(3) 0.32
(4) 320

50. In a compiler, keywords of a language are recognized during ..... .

(1) the code generation
(2) the lexical analysis of the program
(3) parsing of the program
(4) data flow analysis

51. What must be the base of the number, if expression 4 +2 =11 is true ?

(1) 7
(2) 6
(3) 5
(4) 4

52. ..... input values will cause an AND logic gate to produce a HIGH output.

(1) At least one input is HIGH
(2) At least one input is LOW
(3) All inputs are LOW
(4) All inputs are HIGH

53. Which of the following set of gates can be used in a Full-Adder ?

(1) Two half-adders and one OR gate
(2) Two OR gates and one half-adder
(3) One half-adder and two OR gates
(4) One OR gate and one half-adder

54. Which of the following pairs have different expressive power ?

(1) Deterministic finite automata(DFA) and Non-deterministic finite automata (NFA)
(2) Deterministic push down automata(DPDA)and Non-deterministic push down automata(NPDA)
(3) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine
(4) Single-tape Turing machine and multi-tape Turing machine

55. A combinational logic circuit which is used when it is desired to send data from two or more source through a single transmission line is known as :

(1) encoder (2) decoder

(3) multiplexer (4) demultiplexer

56. Which one of the following RAID levels provides the maximum reliability of data storage ?

(1) RAID 10 (2) RAID 4

(3) RAID 5 (4) RAID 6

57. How long is an IPv4 and IPv6 address respectively ?

(1) 64 bits, 32 bits (2) 32bits, 64 bits

(3) 128bits, 32 bits (4) 32 bits, 128 bits

58. Which binary number represents 2' complement of the Hexadecimal number DEAF ?

(1) 0010 0001 0101 0111 (2) 1101 1110 1010 1111

(3) 0010 0001 0101 0011 (4) 0010 0001 0101 0001

59. Which of the following services use TCP ?

(i) DHCP (ii) SMTP (iii) HTTP (iv) TFTP (v) FTP

(1) (i) and (ii) (2) (ii), (iii) and (v)

(3) (i), (ii) and (iv) (4) (i), (iii) and (iv)

60. Identify the ***correct*** statement about the application of XML ?

(1) XML must be used to produce XML and HTML output.

(2) XML can not specify or contain presentation information

(3) XML is used to describe hierarchically organized information.

(4) XML performs the conversion of information between different e-business applications.

61. The set { 1, 2, 4, 7, 8,11,13, 14} is a group under multiplication modulo 15. The inverses of 4 and 7 are respectively :

(1) 3 and 13 (2) 2 and 11

(3) 4 and 13 (4) 8 and 14

62. Thread synchronization is required because :

(1) all threads of a process share the same address space

(2) all threads of a process share the same global variables

(3) all threads of a process can share the same files

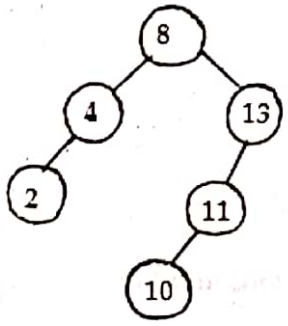
(4) all of the mentioned

63. In the transfer of file between server and client, if the transmission rates along the path is10 Mbps, 20 Mbps, 30 Mbps, 40 Mbps. The throughput is usually :

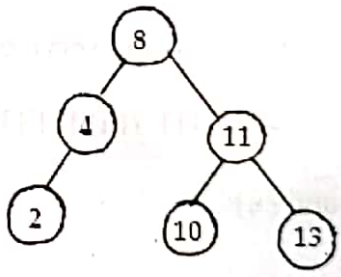
(1) 10 Mbps (2) 20 Mbps

(3) 40 Mbps (4) 50 Mbps

64. Which of the below diagram is following AVL tree property ?



(i)



(ii)

(1) only i (2) only ii

(3) Both i and ii (4) i is not a binary search tree

65. A connected planar graph having 6 vertices, 7 edges contains ..... regions.

(1) 15 (2) 3

(3) 1 (4) 11

66. Which of the following statements are ***correct*** ?

S1 : {02n |n >= 1} is a regular language

S2 : {0m 0n 0(m+n) Im > = 1 and n > = 2} is a regular language

(1) S2 Only

(2) S1 Only

(3) Both Sl and S2

(4) None of S1 and S2 is correct

67. Which one of the following statements is NOT correct about the B+ tree data structure used for creating an index of a relational database table' ?

(1) Each leaf node has a pointer to the next leaf node

(2) Non-leaf nodes have pointers to data records

(3) B+ Tree is a height-balanced tree

(4) Key values in each node are kept in sorted order

68. The Viewing plane or the projector is set up in which of the following position ?

(1) Perpendicular to x and aligned with y, z

(2) Perpendicular to y and aligned with x, z

(3) At origin

(4) Perpendicular to z and aligned with x, y

69. What is the file size of a 640 by 480 pictures of 256 colours in a 8- bit resolution ?

(1) 128 KB

(2) 300 KB

(3) 900 KB

(4) 1024 KB

70. Which of the following is TRUE ?

(1) Every relation in 3NF is also in BCNF

(2) A relation R is in 3NF if every non prime attribute of R is fully functionally dependent on every key of R

(3) Every relation in BCNF is also in 3NF

(4) No relation can be in both BCNF and 3NF

71. Which search is similar to minimax search ?

(1) Hill-climbing search (2) Depth-first search

(3) Breadth-first search (4) All of these

72. Which of the following can be identified as the cloud ?

(1) Intranet (2) Hadoop

(3) Web applications (4) All of the above

73. In which ANN, loops are allowed ?

(1) FeedForward ANN (2) FeedBack ANN

(3) Both (1) and (2) (4) None of the Above

74. Choose the best matching between the Group 1 and their characteristics in Group 2.

	Group – 1		Group – 2
P	Regular expression	1.	Syntax analysis
Q	Pushdown automata	2.	Code generation
R	Dutaflow analysis	3.	Lexical analysis
S	Register allocation	4.	Code optimization

(1) P-3, Q-2, R-1, S-4 (2) P-3, Q-1, R-4, S-2

(3) P-4, Q-2, R-1, S-3 (4) P-1, Q-2, R-3, S-4

75. The total number of states required to automate the given regular expression(00)*(11)*

(1) 3 (2) 4

(3) 5 (4) 6

76. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals{S, A} and terminals {a, b}}.

S → aA {{Print 1}

S → a {Print 2}

A → Sb {Print 3}

(1) 1 3 2 (2) 2 2 3

(3) 2 3 1 (4) Syntax error

77. Which of the following is ***not*** a horn clause ?

(1) p (2) $\phi p \vee q$

(3) $p \rightarrow q$ (4) $p \rightarrow \phi q$

78. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case ?

(1) Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)

(2) Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)

(3) Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)

(4) Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

79. How many states of a DFA can be converted from an NFA with n states ?

(1) n (2) n2

(3) 2n (4) None of these

80. Consider the intermediate code given below :

1. i = 1
2. j = 1
3. t1=5*i
4. t2 = t1 + j
5. t3 = 4 * t2
6. t4 = t3
7. a[t4] = – 1
8. j = j + 1
9. if j <= 5 goto(3)
10. i = i + 1
11. if i < 5 goto(2)

The number of nodes and edges in the control-flow-graph constructed for the above code, respectively, are :

(1) 5 and 7 (2) 6 and 7

(3) 5 and 5 (4) 7 and 8

81. How is a J-K Flip Flop made to toggle ?

(1) J = 0, K = 0 (2) J = 1, K = 0

(3) J = 0, K = 1 (4) J = 1, K = 1.

82. In which 0SI layers does the FDDI protocol operate ?

(I) Physical (II) Data link

(III) Network

(1) I and II (2) II and III

(3) I and III (4) None

83. Number of flip-flops used in decade counter :

(1) 3 (2) 2

(3) 4 (4) None of these

84. The Octal number equivalent of the decimal number 489 is :

(1) 750 (2) 752

(3) 329 (4) 751

85. If the size of the stack is 10 and we try to add the 11th element in the stack then the condition is known as :

(1) Underflow (2) Garbage collection

(3) Overflow (4) None

86. Your router has the following IP address on Ethernet : 172.16.2.1/23. Which of the following can be valid host IDs on the LAN interface attached to the router ?

(i) 172.16.1.100 (ii) 172.16.1.198 (iii) 172.16.2.255 (iv) 172.16.3.0

(1) (i) only

(2) (ii) and (iii) only

(3) (iii) and (iv) only

(4) None of these

87. If the baud rate is 400 for a 4-PSK signal, the bit rate is ..... bps.

(1) 1600 (2) 800

(3) 400 (4) 100

88. A binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called ..... .

(1) Lemma tree

(2) Red Black tree

(3) AVL tree

(4) None of the above

89. What will be the output of the following C code' ?

```
#include <stdio.h>

int main( )

{ int const a = 5;

a++;

printf("%d" ,a);

}
```

(1) 5

(2) 6

(3) Compile time error

(4) Runtime error

90. Which of the following option is ***not*** correct ?

(1) If the queue is implemented with a linked list, keeping track of a front pointer, Only rear pointers will change during an insertion into an non-empty queue.

(2) Queue data structure can be used to implement least recently used (LRU) page fault algorithm and Quick short algorithm.

(3) Queue data structure can be used to implement Quick short algorithm but not least recently used (LRU) page fault algorithm.

(4) Both (1) and (3)

91. Which one of the following is NOT desired in a good Software Requirement Specifications(SRS) document ?

(1) Functional Requirements

(2) Non-Functional Requirements

(3) Goals of Implementation

(4) Algorithms for Software Implementation

92. Which of the following is a widely used and effective machine learning algorithm based on the idea of bagging ?

(1) Decision Tree

(2) Regression

(3) Classification

(4) Random Forest

93. The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are :

(1) TCP, UDP, UDP and TCP

(2) UDP, TCP, TCP and UDP

(3) UDP, TCP, UDP and TCP

(4) TCP, UDP, TCP and UDP

94. Which of the following protocols is used to map MAC address to IP address ?

(1) ARP

(2) RAPP

(3) DNS

(4) None of the above

95. Packets of the same session may be routed through different paths in :

(1) TCP, but not UDP

(2) UDP, but not TCP

(3) TCP and UDP

(4) Neither TCP, nor UDP

96. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

(1) Network layer – 4 times and Data link layer – 4 times

(2) Network layer – 4 times and Data link layer – 6 times

(3) Network layer – 2 times and Data link layer – 6 times

(4) None of the above

97. Which of the following is/are example(s) of stateful application layer protocols ?

(i) HTTP

(ii) FTP

(iii) TCP

(iv) POP3

(1) (i) and (ii) only

(2) (ii) and (iii) only

(3) (ii) and (iv) only

(4) (iv) only

98. In project 802, the data link layer consists of the ..... sublayer and the ..... sublayer.

(1) LAN, MAC
(2) LLC, MAC
(3) CSMA, LLC
(4) LLC, PDU

99. If subnet addresses are 129.253.4.0,129.253.8.0,129.253.12.0 and 129.253.16.0 What is the subnet mask ?

(1) 129.253.7.0
(2) 129.253.31.0
(3) 129.253.192.0
(4) 129.253.252.0

100. What is the standard length of MAC address ?

(1) 16bits
(2) 32 bits
(3) 48 bits
(4) 64 bits

Total No. of Printed Pages : 21

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C

Ph.D./URS-EE-Jan-2022

SET-Y

SUBJECT : Computer Science

10003

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

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SEAL

1. The set { 1, 2, 4, 7, 8,11,13, 14} is a group under multiplication modulo 15. The inverses of 4 and 7 are respectively :

   (1) 3 and 13 (2) 2 and 11

   (3) 4 and 13 (4) 8 and 14

2. Thread synchronization is required because :

   (1) all threads of a process share the same address space

   (2) all threads of a process share the same global variables

   (3) all threads of a process can share the same files

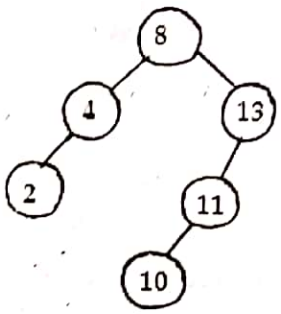
   (4) all of the mentioned

3. In the transfer of file between server and client, if the transmission rates along the path is10 Mbps, 20 Mbps, 30 Mbps, 40 Mbps. The throughput is usually :

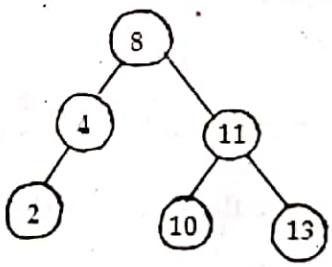
   (1) 10 Mbps (2) 20 Mbps

   (3) 40 Mbps (4) 50 Mbps

4. Which of the below diagram is following AVL tree property ?



(i)



(ii)

   (1) only i (2) only ii

   (3) Both i and ii (4) i is not a binary search tree

5. A connected planar graph having 6 vertices, 7 edges contains ..... regions.

   (1) 15 (2) 3

   (3) 1 (4) 11

6. Which of the following statements are *correct* ?

S1 : {02n |n >= 1} is a regular language

S2 : {0m 0n 0(m+n) Im > = 1 and n > = 2} is a regular language

(1) S2 Only
(2) S1 Only
(3) Both Sl and S2
(4) None of S1 and S2 is correct

7. Which one of the following statements is NOT correct about the B+ tree data structure used for creating an index of a relational database table' ?

(1) Each leaf node has a pointer to the next leaf node

(2) Non-leaf nodes have pointers to data records

(3) B+ Tree is a height-balanced tree

(4) Key values in each node are kept in sorted order

8. The Viewing plane or the projector is set up in which of the following position ?

(1) Perpendicular to x and aligned with y, z

(2) Perpendicular to y and aligned with x, z

(3) At origin

(4) Perpendicular to z and aligned with x, y

9. What is the file size of a 640 by 480 pictures of 256 colours in a 8- bit resolution ?

(1) 128 KB
(2) 300 KB
(3) 900 KB
(4) 1024 KB

10. Which of the following is TRUE ?

(1) Every relation in 3NF is also in BCNF

(2) A relation R is in 3NF if every non prime attribute of R is fully functionally dependent on every key of R

(3) Every relation in BCNF is also in 3NF

(4) No relation can be in both BCNF and 3NF

11. What must be the base of the number, if expression 4 +2 =11 is true ?

(1) 7 (2) 6

(3) 5 (4) 4

12. ..... input values will cause an AND logic gate to produce a HIGH output.

(1) At least one input is HIGH (2) At least one input is LOW

(3) All inputs are LOW (4) All inputs are HIGH

13. Which of the following set of gates can be used in a Full-Adder ?

(1) Two half-adders and one OR gate

(2) Two OR gates and one half-adder

(3) One half-adder and two OR gates

(4) One OR gate and one half-adder

14. Which of the following pairs have different expressive power ?

(1) Deterministic finite automata(DFA) and Non-deterministic finite automata (NFA)

(2) Deterministic push down automata(DPDA)and Non-deterministic push down automata(NPDA)

(3) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine

(4) Single-tape Turing machine and multi-tape Turing machine

15. A combinational logic circuit which is used when it is desired to send data from two or more source through a single transmission line is known as :

(1) encoder (2) decoder

(3) multiplexer (4) demultiplexer

16. Which one of the following RAID levels provides the maximum reliability of data storage ?

(1) RAID 10 (2) RAID 4

(3) RAID 5 (4) RAID 6

17. How long is an IPv4 and IPv6 address respectively ?

(1) 64 bits, 32 bits (2) 32bits, 64 bits

(3) 128bits, 32 bits (4) 32 bits, 128 bits

18. Which binary number represents 2' complement of the Hexadecimal number DEAF ?

(1) 0010 0001 0101 0111 (2) 1101 1110 1010 1111

(3) 0010 0001 0101 0011 (4) 0010 0001 0101 0001

19. Which of the following services use TCP ?

(i) DHCP (ii) SMTP (iii) HTTP (iv) TFTP (v) FTP

(1) (i) and (ii) (2) (ii), (iii) and (v)

(3) (i), (ii) and (iv) (4) (i), (iii) and (iv)

20. Identify the ***correct*** statement about the application of XML ?

(1) XML must be used to produce XML and HTML output.

(2) XML can not specify or contain presentation information

(3) XML is used to describe hierarchically organized information.

(4) XML performs the conversion of information between different e-business applications.

21. How is a J-K Flip Flop made to toggle ?

(1) J = 0, K = 0 (2) J = 1, K = 0

(3) J = 0, K = 1 (4) J = 1, K = 1

22. In which 0SI layers does the FDDI protocol operate ?

(I) Physical (II) Data link

(III) Network

(1) I and II (2) II and III

(3) I and III (4) None

23. Number of flip-flops used in decade counter :

(1) 3 (2) 2

(3) 4 (4) None of these

24. The Octal number equivalent of the decimal number 489 is :

(1) 750 (2) 752

(3) 329 (4) 751

25. If the size of the stack is 10 and we try to add the 11th element in the stack then the condition is known as :

(1) Underflow (2) Garbage collection

(3) Overflow (4) None

26. Your router has the following IP address on Ethernet : 172.16.2.1/23. Which of the following can be valid host IDs on the LAN interface attached to the router ?

(i) 172.16.1.100 (ii) 172.16.1.198 (iii) 172.16.2.255 (iv) 172.16.3.0

(1) (i) only

(2) (ii) and (iii) only

(3) (iii) and (iv) only

(4) None of these

27. If the baud rate is 400 for a 4-PSK signal, the bit rate is ..... bps.

(1) 1600 (2) 800

(3) 400 (4) 100

28. A binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called ..... .

(1) Lemma tree (2) Red Black tree

(3) AVL tree (4) None of the above

29. What will be the output of the following C code' ?

```
#include <stdio.h>
int main( )
{ int const a = 5;
a++;
printf("%d" ,a);
}
```

(1) 5 (2) 6

(3) Compile time error (4) Runtime error

30. Which of the following option is ***not*** correct ?

(1) If the queue is implemented with a linked list, keeping track of a front pointer, Only rear pointers will change during an insertion into an non-empty queue.

(2) Queue data structure can be used to implement least recently used (LRU) page fault algorithm and Quick short algorithm.

(3) Queue data structure can be used to implement Quick short algorithm but not least recently used (LRU) page fault algorithm.

(4) Both (1) and (3)

31. Which of the following problems is NOT NP-hard ?

(1) Hamiltonian circuit problem (2) The 0/1 Knapsack Problem

(3) The graph colouring problem (4) None of these

32. PGP encrypts data by using a block cipher called :

(1) International data encryption algorithm

(2) Private data encryption algorithm

(3) Internet data encryption algorithm

(4) Local data encryption algorithm

33. The following numbers are inserted into an empty binary search tree in the given order : 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree ?

(1) 2 (2) 3

(3) 4 (4) 6

34. Correct statements about static function in C++ code are :

(I) Static function of a class can be called by class name using scope resolution operator i.e.

(II) Static function can receive both static and non-static data members of a class

(III) Static function is not the part of an object of a class

(1) I and II (2) I only

(3) I and III (4) I, II and III

35. Consider the function f defined below :

```
struct item
{
int data;
struct item * next;
};
int f(struct item *p)
{
return (
    (p == NULL) ||
    (p->next == NULL) ||
    (( P->data <= p->next->data) && f(p->next))
    );
}
```

For a given linked list p, the function f returns 1 if and only if :

(1) the list is empty or has exactly one element.

(2) the elements in the list are sorted in non-decreasing order of data value

(3) the elements in the list are sorted in non-increasing order of data value

(4) not all elements in the list have the same data value

36. What is the purpose of bin directory in Linux environment ?

(1) Contains essential device files
(2) Contains essential binary commands
(3) Containing configuration files
(4) Contains user home directories

37. The maximum number of nodes in a tree for which post-order and pre-order traversals may be equal is :

(1) 1
(2) 2
(3) 3
(4) any number

38. In a C programming language $x - = y + 1$ means :

(1) $x = -x - y - 1$
(2) $x = x - y + 1$
(3) $x = x - y - 1$
(4) $x = -x + y + 1$

39. A 4-input neuron has weights 1, 2, 3, and 4. The transfer function is linear, with the constant of proportionality being equal to 2. The inputs are 4,10,5, and 20 respectively. The output will be :

(1) 76
(2) 238
(3) 123
(4) 119

40. C++ abstract class can contain :

(1) Pure virtual function
(2) Non-virtual function
(3) Only pure virtual function
(4) Both pure virtual and non-virtual function

41. Which search is similar to minimax search ?

(1) Hill-climbing search
(2) Depth-first search
(3) Breadth-first search
(4) All of these

42. Which of the following can be identified as the cloud ?

(1) Intranet
(2) Hadoop
(3) Web applications
(4) All of the above

43. In which ANN, loops are allowed ?

(1) FeedForward ANN (2) FeedBack ANN

(3) Both (1) and (2) (4) None of the Above

44. Choose the best matching between the Group 1 and their characteristics in Group 2.

	Group – 1		Group – 2
P	Regular expression	1.	Syntax analysis
Q	Pushdown automata	2.	Code generation
R	Dutaflow analysis	3.	Lexical analysis
S	Register allocation	4.	Code optimization

(1) P-3, Q-2, R-1, S-4 (2) P-3, Q-1, R-4, S-2

(3) P-4, Q-2, R-1, S-3 (4) P-1, Q-2, R-3, S-4

45. The total number of states required to automate the given regular expression(00)*(11)*

(1) 3 (2) 4

(3) 5 (4) 6

46. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals{S, A} and terminals {a, b}}.

$S \rightarrow aA$ {{Print 1}

$S \rightarrow a$ {Print 2}

$A \rightarrow Sb$ {Print 3}

(1) 1 3 2 (2) 2 2 3

(3) 2 3 1 (4) Syntax error

47. Which of the following is ***not*** a horn clause ?

(1) p (2) $\phi p \vee q$

(3) $p \rightarrow q$ (4) $p \rightarrow \phi q$

48. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case ?

(1) Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)

(2) Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)

(3) Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)

(4) Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

49. How many states of a DFA can be converted from an NFA with n states ?

(1) n (2) n2

(3) 2n (4) None of these

50. Consider the intermediate code given below :

1. i = 1
2. j = 1
3. t1=5*i
4. t2 = t1 + j
5. t3 = 4 * t2
6. t4 = t3
7. a[t4] = – 1
8. j = j + 1
9. if j <= 5 goto(3)
10. i = i + 1
11. if i < 5 goto(2)

The number of nodes and edges in the control-flow-graph constructed for the above code, respectively, are :

(1) 5 and 7 (2) 6 and 7 (3) 5 and 5 (4) 7 and 8

51. The web browser request goes to the server in :
(1) Hex form (2) ASCII form
(3) Binary form (4) Text form

52. What does error 404 or Not Found error while accessing a URL mean ?
(1) The server could not find the requested URL
(2) Requested HTML file is not available
(3) The path to the interpreter of the script is not valid
(4) The requested HTML file does not have sufficient permissions

53. Which of the following can be used to store 1 bit of data ?
(1) Encoder (2) OR gate
(3) Flip-Flop (4) Decoder

54. Which one of the following about the MIPS rating of a computer is FALSE ?
(1) MIPS rating of a computer depends on the compiler being used
(2) MIPS rating of a processor is independent of the Program is being executed
(3) MIPS rating of a computer can vary based on which instructions of a processor are being considered.
(4) MIPS rating of a computer depends upon the clock rate of the processor

55. The interval from the time of submission of a process to the time of completion is termed as :
(1) waiting time (2) turn around time
(3) response time (4) throughput

56. In FTP protocol, client contacts server using ..... as the transport protocol.
(1) transmission control protocol
(2) user datagram protocol
(3) datagram congestion control protocol
(4) stream control transmission protocol

57. Which of the following would cause the Page Fault frequency in an operating system to reduce ?

(1) Cache memory size is increased

(2) Size of pages is reduced

(3) Executing processes remain CPU bound

(4) Executing processes exhibit high locality of reference

58. The technique of memory compaction and reuse of memory can be applied to overcome the problem of :

(1) External fragmentation (2) Internal Fragmentation

(3) Page Fault (4) Swapping

59. For a 10 Mbps Ethernet link, if the length of the packet is 32 bits, the transmission delay is ..... (in microseconds).

(1) 3.2 (2) 32

(3) 0.32 (4) 320

60. In a compiler, keywords of a language are recognized during ..... .

(1) the code generation (2) the lexical analysis of the program

(3) parsing of the program (4) data flow analysis

61. Consider the 3 processes, P1, P2 and P3 shown in the table :

Process	Arrival time	Time Units Required
P1	0	5
P2	1	7
P3	3	4

The completion order of the 3 processes under the policies FCFS and RR2 (round robin scheduling with CPU quantum of 2 time units) are

(1) FCFS : P1, P2, P3 RR2 : P1, P2, P3

(2) FCFS : P1, P3, P2 RR2 : P1, P3, P2

(3) FCFS : P1, P2, P3 RR2 : P1, P3, P2

(4) FCFS : P1, P3, P2 RR2 : P1, P2, P3

62. Consider a system with byte-addressable memory, 32 bit logical addresses, 4 kilobyte page size and page table entries of 4 bytes each. What is the size of the page table in the system ?

(1) 4 Megabyte
(2) 4 Kilobyte
(3) 2 Megabyte
(4) 2 Kilobyte

63. A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements :

P : Increasing the number of page frames allocated to a process sometimes increases the page fault rate.

Q : Some programs do not exhibit locality of reference.

Which one of the following is TRUE ?

(1) Both P and Q are true, and Q is the reason for P
(2) Both P and Q are true, but Q is not the reason for P.
(3) P is false, but Q is true
(4) Both P and Q are false

64. On a system using fixed partitions, all of size 2^8, the number of bits used by the limit register is :

(1) 8
(2) 64
(3) 127
(4) 256

65. Consider a disk drive with 16 surfaces, 512 tracks/surface, 512 sectors/track, 1 KB/sector, rotation speed 3000 rpm. The disk is operated in cycle stealing mode whereby whenever one byte word is ready it is sent to memory; similarly, for writing, the disk interface reads a 4 byte word from the memory in each DMA cycle. Memory cycle time is 40 nsec. The maximum percentage of time that the CPU gets blocked during DMA operation is :

(1) 10
(2) 25
(3) 40
(4) 50

66. G is a graph on n vertices and 2n–2 edges. The edges of G can be partitioned into two edge-disjoint spanning trees. Which of the following is NOT true for G ?

(1) For every subset of k vertices, the induced subgraph has at most 2k-2 edges
(2) The minimum cut in G has at least two edges
(3) There are two edge-disjoint paths between every pair to vertices
(4) There are two vertex-disjoint paths between every pair of vertices

67. In AI, the problem space of means-end analysis has :

(1) An initial state and one or more goal states

(2) One or more initial states and one goal state

(3) One or more initial states and one or more goal state

(4) One initial state and one goal state

68. If A and B are two fuzzy sets with membership functions : $\mu_a(\chi)$ ={0.2, 0.5., 0.6, 0.1. 0.9} , $\mu_b(\chi)$= {0.1 ,0.5,0.2,0.7,0.8}, then the value of $\mu_a \cup \mu_b$ will be :

(1) {0.2,0.5,0.6,0.7,0.9}

(2) {0.2, 0.5,0.2, 0.1,0.8}

(3) {0.1, 0.5, 0.6, 0.1, 0.8}

(4) {0.1, 0.5, 0.2, 0.1,0.8}

69. Which of the following is ***correct*** for the neural network ?

I The training time is dependent on the size of the network

II Neural networks can be simulated on the conventional computers

III Artificial neurons are identical in operation to a biological one

(1) I is true (2) II is true

(3) I and II are true (4) All of the above

70. A ..... begins by hypothesizing a sentence (the symbol S) and successively predicting lower level constituents until individual pre-terminal symbols are written.

(1) bottom-up parser (2) top parser

(3) top-down parser (4) bottom parser

71. Which one of the following is NOT desired in a good Software Requirement Specifications(SRS) document ?

(1) Functional Requirements (2) Non-Functional Requirements

(3) Goals of Implementation (4) Algorithms for Software Implementation

72. Which of the following is a widely used and effective machine learning algorithm based on the idea of bagging ?

(1) Decision Tree
(2) Regression
(3) Classification
(4) Random Forest

73. The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are :

(1) TCP, UDP, UDP and TCP
(2) UDP, TCP, TCP and UDP
(3) UDP, TCP, UDP and TCP
(4) TCP, UDP, TCP and UDP

74. Which of the following protocols is used to map MAC address to IP address ?

(1) ARP
(2) RAPP
(3) DNS
(4) None of the above

75. Packets of the same session may be routed through different paths in :

(1) TCP, but not UDP
(2) UDP, but not TCP
(3) TCP and UDP
(4) Neither TCP, nor UDP

76. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

(1) Network layer – 4 times and Data link layer – 4 times
(2) Network layer – 4 times and Data link layer – 6 times
(3) Network layer – 2 times and Data link layer – 6 times
(4) None of the above

77. Which of the following is/are example(s) of stateful application layer protocols ?

(i) HTTP (ii) FTP

(iii) TCP (iv) POP3

(1) (i) and (ii) only (2) (ii) and (iii) only

(3) (ii) and (iv) only (4) (iv) only

78. In project 802, the data link layer consists of the ..... sublayer and the ..... sublayer.

(1) LAN, MAC (2) LLC, MAC

(3) CSMA, LLC (4) LLC, PDU

79. If subnet addresses are 129.253.4.0,129.253.8.0,129.253.12.0 and 129.253.16.0 What is the subnet mask ?

(1) 129.253.7.0 (2) 129.253.31.0

(3) 129.253.192.0 (4) 129.253.252.0

80. What is the standard length of MAC address ?

(1) 16bits (2) 32 bits

(3) 48 bits (4) 64 bits

81. The best data structure to check whether an arithmetic expression has balanced parentheses is a :

(1) stack (2) queue

(3) tree (4) list

82. In inheritance, order of execution of base class and derived class destructors are :

(1) Base to derived (2) Derived to base

(3) Random order (4) none

83. What logic function is obtained by adding an inverter to the inputs of an OR gate ?

(1) OR (2) NAND

(3) XOR (4) NOR

84. A C program contains the following declaration :

static int X{8) = { 10, 20, 30, 40, 50, 60, 70, 80}

What are the values of (*X +2) and *(X+ 2) ?

(1) 10, 30 (2) 10, 32

(3) 30, 12 (4) 12, 30

85. Which of the application layer loT Protocols uses telemetry communication pattern ?

(1) COAP (2) MQTT

(3) AMQP (4) None of the above

86. Suppose V is a signed 16-bit integer with hexadecimal value 0 × 369C. What will be the result of V<<4 ?

(1) 0 × 669C (2) 0 × 69C0

(3) 0 × 0369 (4) None of the above

87. A computer has five resources, with n processes competing for them. Each process may need two resources. What is the maximum value of n for the system to be deadlock free ?

(1) 5 (2) 4

(3) 3 (4) 2

88. Which of the following condition is required for a deadlock to be possible ?

(1) mutual exclusion

(2) a process may hold allocated resources while awaiting assignment of other resources

(3) no resource can be forcibly removed from a process holding it

(4) all of the mentioned

89. Let G be a simple undirected planar graph of 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to :

(1) 6 (2) 5

(3) 4 (4) 3

90. $(p \rightarrow r) \vee (q \rightarrow r)$ is logically equivalent to :

(1) $(p \wedge q) \vee r$ (2) $(p \vee q) \rightarrow r$

(3) $(p \wedge q) \rightarrow r$ (4) $(p \rightarrow q) \rightarrow r$

91. Which transformation distorts the shape of an object such that the transformed shape appears as if the object were composed of internal layers that had been caused to slide over each other ?

(1) Rotation (2) Scaling up

(3) Scaling down (4) Shearing

92. Which of the following type of perspective projection is used in drawings of railway lines ?

(1) Three-point

(2) Two-point

(3) One-point

(4) Perspective projection is not used to draw railway lines

93. After performing Y-shear transformation on triangle we get A(2,5),B(4,11),C(2,7). If the constant value is 2, then original coordinates will be :

(1) A(2, 5), B(4, 11),C(2, 7) (2) A(2, 1), B(4, 3),C(2, 3)

(3) A(4, 1), B(10,3), C{4, 3) (4) A(5, 11), B(3, 4),C(3, 2)

94. In the context of modular software design, which one of the following combinations is desirable :

(1) High cohesion and high coupling (2) High cohesion and low coupling

(3) Low cohesion and high coupling (4) Low cohesion and low coupling

95. GSM is an example of :

(1) TDMA cellular systems

(2) FDMA cellular systems

(3) CDMA cellular systems

(4) SDMA cellular systems

96. A key concept of quality control is that all work products :

(1) Are delivered on time and under budget

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(3) Have measurable specifications for process outputs

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97. The theoretic concept that will be useful in software testing is :

(1) Hamiltonian circuit

(2) Cyclomatic number

(3) Eulerian Cycle

(4) None of these

98. Which is not a task of software Configuration Management ?

(1) Version control

(2) Reporting

(3) Change management

(4) Ouality control

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(1) System design phase

(2) System development phase

(3) System analysis phase

(4) System testing phase

100. Consider the following C code. Assume that unsigned long int type length is 64 bits.

```
unsigned long int fun(unsigned long int n) {
unsigned long int i, j, j=0, sum = 0;
for (i = n; i > 1; i = i/2) j++;
for ( ; j > 1; j = j/2) sum++;
return sum;
}
```

The value returned when we call fun with the input 2^{40} is :

(1) 4

(2) 5

(3) 6

(4) 40

Total No. of Printed Pages : 21

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D

SET-Y

Ph.D./URS-EE-Jan-2022

SUBJECT : Computer Science

10024

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Father's Name _____

Mother's Name _____ Date of Examination _____

_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

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2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E.Mail within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

SEAL

1. Consider the 3 processes, P1, P2 and P3 shown in the table :

Process	Arrival time	Time Units Required
P1	0	5
P2	1	7
P3	3	4

The completion order of the 3 processes under the policies FCFS and RR2 (round robin scheduling with CPU quantum of 2 time units) are

(1) FCFS : P1, P2, P3 RR2 : P1, P2, P3

(2) FCFS : P1, P3, P2 RR2 : P1, P3, P2

(3) FCFS : P1, P2, P3 RR2 : P1, P3, P2

(4) FCFS : P1, P3, P2 RR2 : P1, P2, P3

2. Consider a system with byte-addressable memory, 32 bit logical addresses, 4 kilobyte page size and page table entries of 4 bytes each. What is the size of the page table in the system ?

(1) 4 Megabyte (2) 4 Kilobyte

(3) 2 Megabyte (4) 2 Kilobyte

3. A virtual memory system uses First In First Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statements :

P : Increasing the number of page frames allocated to a process sometimes increases the page fault rate.

Q : Some programs do not exhibit locality of reference.

Which one of the following is TRUE ?

(1) Both P and Q are true, and Q is the reason for P

(2) Both P and Q are true, but Q is not the reason for P.

(3) P is false, but Q is true

(4) Both P and Q are false

4. On a system using fixed partitions, all of size 2^8, the number of bits used by the limit register is :

(1) 8 (2) 64

(3) 127 (4) 256

5. Consider a disk drive with 16 surfaces, 512 tracks/surface, 512 sectors/track, 1 KB/sector, rotation speed 3000 rpm. The disk is operated in cycle stealing mode whereby whenever one byte word is ready it is sent to memory; similarly, for writing, the disk interface reads a 4 byte word from the memory in each DMA cycle. Memory cycle time is 40 nsec. The maximum percentage of time that the CPU gets blocked during DMA operation is :

(1) 10 (2) 25

(3) 40 (4) 50

6. G is a graph on n vertices and 2n–2 edges. The edges of G can be partitioned into two edge-disjoint spanning trees. Which of the following is NOT true for G ?

(1) For every subset of k vertices, the induced subgraph has at most 2k-2 edges

(2) The minimum cut in G has at least two edges

(3) There are two edge-disjoint paths between every pair to vertices

(4) There are two vertex-disjoint paths between every pair of vertices

7. In Al, the problem space of means-end analysis has :

(1) An initial state and one or more goal states

(2) One or more initial states and one goal state

(3) One or more initial states and one or more goal state

(4) One initial state and one goal state

8. If A and B are two fuzzy sets with membership functions : $\mu_a(\chi)$ ={0.2, 0.5., 0.6, 0.1, 0.9} , $\mu_b(\chi)$= {0.1 ,0.5,0.2,0.7,0.8}, then the value of $\mu_a \cup \mu_b$ will be :

(1) {0.2,0.5,0.6,0.7,0.9}

(2) {0.2, 0.5,0.2, 0.1,0.8}

(3) {0.1, 0.5, 0.6, 0.1, 0.8}

(4) {0.1, 0.5, 0.2, 0.1,0.8}

9. Which of the following is ***correct*** for the neural network ?

I The training time is dependent on the size of the network

II Neural networks can be simulated on the conventional computers

III Artificial neurons are identical in operation to a biological one

(1) I is true
(2) II is true
(3) I and II are true
(4) All of the above

10. A ..... begins by hypothesizing a sentence (the symbol S) and successively predicting lower level constituents until individual pre-terminal symbols are written.

(1) bottom-up parser
(2) top parser
(3) top-down parser
(4) bottom parser

11. Which transformation distorts the shape of an object such that the transformed shape appears as if the object were composed of internal layers that had been caused to slide over each other ?

(1) Rotation
(2) Scaling up
(3) Scaling down
(4) Shearing

12. Which of the following type of perspective projection is used in drawings of railway lines ?

(1) Three-point
(2) Two-point
(3) One-point
(4) Perspective projection is not used to draw railway lines

13. After performing Y-shear transformation on triangle we get A(2,5),B(4,11),C(2,7). If the constant value is 2, then original coordinates will be :

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for ( ; j > 1; j = j/2) sum++;
return sum;
}
```

The value returned when we call fun with the input 2^{40} is :

(1) 4 (2) 5

(3) 6 (4) 40

21. The web browser request goes to the server in :

(1) Hex form (2) ASCII form

(3) Binary form (4) Text form

22. What does error 404 or Not Found error while accessing a URL mean ?

(1) The server could not find the requested URL

(2) Requested HTML file is not available

(3) The path to the interpreter of the script is not valid

(4) The requested HTML file does not have sufficient permissions

23. Which of the following can be used to store 1 bit of data ?

(1) Encoder (2) OR gate

(3) Flip-Flop (4) Decoder

24. Which one of the following about the MIPS rating of a computer is FALSE ?

(1) MIPS rating of a computer depends on the compiler being used

(2) MIPS rating of a processor is independent of the Program is being executed

(3) MIPS rating of a computer can vary based on which instructions of a processor are being considered.

(4) MIPS rating of a computer depends upon the clock rate of the processor

25. The interval from the time of submission of a process to the time of completion is termed as :

(1) waiting time
(2) turn around time
(3) response time
(4) throughput

26. In FTP protocol, client contacts server using ..... as the transport protocol.

(1) transmission control protocol
(2) user datagram protocol
(3) datagram congestion control protocol
(4) stream control transmission protocol

27. Which of the following would cause the Page Fault frequency in an operating system to reduce ?

(1) Cache memory size is increased
(2) Size of pages is reduced
(3) Executing processes remain CPU bound
(4) Executing processes exhibit high locality of reference

28. The technique of memory compaction and reuse of memory can be applied to overcome the problem of :

(1) External fragmentation
(2) Internal Fragmentation
(3) Page Fault
(4) Swapping

29. For a 10 Mbps Ethernet link, if the length of the packet is 32 bits, the transmission delay is ..... (in microseconds).

(1) 3.2
(2) 32
(3) 0.32
(4) 320

30. In a compiler, keywords of a language are recognized during ..... .

(1) the code generation
(2) the lexical analysis of the program
(3) parsing of the program
(4) data flow analysis

31. The best data structure to check whether an arithmetic expression has balanced parentheses is a :

(1) stack (2) queue

(3) tree (4) list

32. In inheritance, order of execution of base class and derived class destructors are :

(1) Base to derived (2) Derived to base

(3) Random order (4) none

33. What logic function is obtained by adding an inverter to the inputs of an OR gate ?

(1) OR (2) NAND

(3) XOR (4) NOR

34. A C program contains the following declaration :

static int X{8) = { 10, 20, 30, 40, 50, 60, 70, 80}

What are the values of (*X +2) and *(X+ 2) ?

(1) 10, 30 (2) 10, 32

(3) 30, 12 (4) 12, 30

35. Which of the application layer loT Protocols uses telemetry communication pattern ?

(1) COAP (2) MQTT

(3) AMQP (4) None of the above

36. Suppose V is a signed 16-bit integer with hexadecimal value 0 × 369C. What will be the result of V<<4 ?

(1) 0 × 669C (2) 0 × 69C0

(3) 0 × 0369 (4) None of the above

37. A computer has five resources, with n processes competing for them. Each process may need two resources. What is the maximum value of n for the system to be deadlock free ?

(1) 5 (2) 4

(3) 3 (4) 2

38. Which of the following condition is required for a deadlock to be possible ?

(1) mutual exclusion

(2) a process may hold allocated resources while awaiting assignment of other resources

(3) no resource can be forcibly removed from a process holding it

(4) all of the mentioned

39. Let G be a simple undirected planar graph of 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to :

(1) 6 (2) 5

(3) 4 (4) 3

40. $(p \rightarrow r) \vee (q \rightarrow r)$ is logically equivalent to :

(1) $(p \wedge q) \vee r$ (2) $(p \vee q) \rightarrow r$

(3) $(p \wedge q) \rightarrow r$ (4) $(p \rightarrow q) \rightarrow r$

41. Which of the following problems is NOT NP-hard ?

(1) Hamiltonian circuit problem (2) The 0/1 Knapsack Problem

(3) The graph colouring problem (4) None of these

42. PGP encrypts data by using a block cipher called :

(1) International data encryption algorithm

(2) Private data encryption algorithm

(3) Internet data encryption algorithm

(4) Local data encryption algorithm

43. The following numbers are inserted into an empty binary search tree in the given order : 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree ?

(1) 2 (2) 3

(3) 4 (4) 6

44. Correct statements about static function in C++ code are :

(I) Static function of a class can be called by class name using scope resolution operator i.e.

(II) Static function can receive both static and non-static data members of a class

(III) Static function is not the part of an object of a class

(1) I and II (2) I only

(3) I and III (4) I, II and III

45. Consider the function f defined below :

```
struct item
{
int data;
struct item * next;
};
int f(struct item *p)
{
return (
    (p == NULL) ||
    (p->next == NULL) ||
    (( P->data <= p->next->data) && f(p->next))
    );
}
```

For a given linked list p, the function f returns 1 if and only if :

(1) the list is empty or has exactly one element

(2) the elements in the list are sorted in non-decreasing order of data value

(3) the elements in the list are sorted in non-increasing order of data value

(4) not all elements in the list have the same data value

46. What is the purpose of bin directory in Linux environment ?

(1) Contains essential device files
(2) Contains essential binary commands
(3) Containing configuration files
(4) Contains user home directories

47. The maximum number of nodes in a tree for which post-order and pre-order traversals may be equal is :

(1) 1
(2) 2
(3) 3
(4) any number

48. In a C programming language $x - = y + 1$ means :

(1) $x = -x - y - 1$
(2) $x = x - y + 1$
(3) $x = x - y - 1$
(4) $x = -x + y + 1$

49. A 4-input neuron has weights 1, 2, 3, and 4. The transfer function is linear, with the constant of proportionality being equal to 2. The inputs are 4,10,5, and 20 respectively. The output will be :

(1) 76
(2) 238
(3) 123
(4) 119

50. C++ abstract class can contain :

(1) Pure virtual function
(2) Non-virtual function
(3) Only pure virtual function
(4) Both pure virtual and non-virtual function

51. Which search is similar to minimax search ?

(1) Hill-climbing search
(2) Depth-first search
(3) Breadth-first search
(4) All of these

52. Which of the following can be identified as the cloud ?

(1) Intranet
(2) Hadoop
(3) Web applications
(4) All of the above

53. In which ANN, loops are allowed ?

(1) FeedForward ANN (2) FeedBack ANN

(3) Both (1) and (2) (4) None of the Above

54. Choose the best matching between the Group 1 and their characteristics in Group 2.

	Group – 1		Group – 2
P	Regular expression	1.	Syntax analysis
Q	Pushdown automata	2.	Code generation
R	Dutaflow analysis	3.	Lexical analysis
S	Register allocation	4.	Code optimization

(1) P-3, Q-2, R-1, S-4 (2) P-3, Q-1, R-4, S-2

(3) P-4, Q-2, R-1, S-3 (4) P-1, Q-2, R-3, S-4

55. The total number of states required to automate the given regular expression(00)*(11)*

(1) 3 (2) 4

(3) 5 (4) 6

56. Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals{S, A} and terminals {a, b}}.

$S \rightarrow aA$ {{Print 1}

$S \rightarrow a$ {Print 2}

$A \rightarrow Sb$ {Print 3}

(1) 1 3 2 (2) 2 2 3

(3) 2 3 1 (4) Syntax error

57. Which of the following is ***not*** a horn clause ?

(1) p (2) $\phi p \vee q$

(3) $p \rightarrow q$ (4) $p \rightarrow \phi q$

58. What is recurrence for worst case of QuickSort and what is the time complexity in Worst case ?

(1) Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)

(2) Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)

(3) Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)

(4) Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

59. How many states of a DFA can be converted from an NFA with n states ?

(1) n (2) n2

(3) 2n (4) None of these

60. Consider the intermediate code given below :

1. i = 1
2. j = 1
3. t1=5*i
4. t2 = t1 + j
5. t3 = 4 * t2
6. t4 = t3
7. a[t4] = – 1
8. j = j + 1
9. if j <= 5 goto(3)
10. i = i + 1
11. if i < 5 goto(2)

The number of nodes and edges in the control-flow-graph constructed for the above code, respectively, are :

(1) 5 and 7 (2) 6 and 7 (3) 5 and 5 (4) 7 and 8

61. Which one of the following is NOT desired in a good Software Requirement Specifications(SRS) document ?

(1) Functional Requirements

(2) Non-Functional Requirements

(3) Goals of Implementation

(4) Algorithms for Software Implementation

62. Which of the following is a widely used and effective machine learning algorithm based on the idea of bagging ?

(1) Decision Tree (2) Regression

(3) Classification (4) Random Forest

63. The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are :

(1) TCP, UDP, UDP and TCP

(2) UDP, TCP, TCP and UDP

(3) UDP, TCP, UDP and TCP

(4) TCP, UDP, TCP and UDP

64. Which of the following protocols is used to map MAC address to IP address ?

(1) ARP (2) RAPP

(3) DNS (4) None of the above

65. Packets of the same session may be routed through different paths in :

(1) TCP, but not UDP

(2) UDP, but not TCP

(3) TCP and UDP

(4) Neither TCP, nor UDP

66. Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

(1) Network layer – 4 times and Data link layer – 4 times

(2) Network layer – 4 times and Data link layer – 6 times

(3) Network layer – 2 times and Data link layer – 6 times

(4) None of the above

67. Which of the following is/are example(s) of stateful application layer protocols ?

(i) HTTP (ii) FTP

(iii) TCP (iv) POP3

(1) (i) and (ii) only (2) (ii) and (iii) only

(3) (ii) and (iv) only (4) (iv) only

68. In project 802, the data link layer consists of the ..... sublayer and the ..... sublayer.

(1) LAN, MAC (2) LLC, MAC

(3) CSMA, LLC (4) LLC, PDU

69. If subnet addresses are 129.253.4.0,129.253.8.0,129.253.12.0 and 129.253.16.0 What is the subnet mask ?

(1) 129.253.7.0 (2) 129.253.31.0

(3) 129.253.192.0 (4) 129.253.252.0

70. What is the standard length of MAC address ?

(1) 16bits (2) 32 bits

(3) 48 bits (4) 64 bits

71. The set { 1, 2, 4, 7, 8,11,13, 14} is a group under multiplication modulo 15. The inverses of 4 and 7 are respectively :

(1) 3 and 13
(2) 2 and 11
(3) 4 and 13
(4) 8 and 14

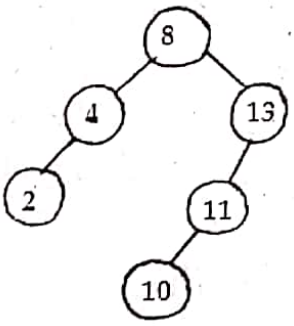
72. Thread synchronization is required because :

(1) all threads of a process share the same address space
(2) all threads of a process share the same global variables
(3) all threads of a process can share the same files
(4) all of the mentioned

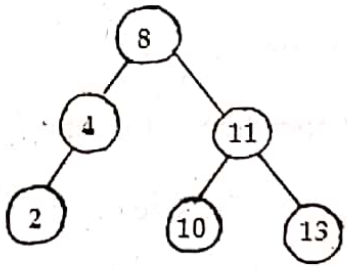
73. In the transfer of file between server and client, if the transmission rates along the path is10 Mbps, 20 Mbps, 30 Mbps, 40 Mbps. The throughput is usually :

(1) 10 Mbps
(2) 20 Mbps
(3) 40 Mbps
(4) 50 Mbps

74. Which of the below diagram is following AVL tree property ?



(i)



(ii)

(1) only i
(2) only ii
(3) Both i and ii
(4) i is not a binary search tree

75. A connected planar graph having 6 vertices, 7 edges contains ..... regions.

(1) 15
(2) 3
(3) 1
(4) 11

76. Which of the following statements are *correct* ?

S1 : {02n |n >= 1} is a regular language

S2 : {0m 0n 0(m+n) Im > = 1 and n > = 2} is a regular language

(1) S2 Only
(2) S1 Only
(3) Both Sl and S2
(4) None of S1 and S2 is correct

77. Which one of the following statements is NOT correct about the B+ tree data structure used for creating an index of a relational database table' ?

(1) Each leaf node has a pointer to the next leaf node

(2) Non-leaf nodes have pointers to data records

(3) B+ Tree is a height-balanced tree

(4) Key values in each node are kept in sorted order

78. The Viewing plane or the projector is set up in which of the following position ?

(1) Perpendicular to x and aligned with y, z

(2) Perpendicular to y and aligned with x, z

(3) At origin

(4) Perpendicular to z and aligned with x, y

79. What is the file size of a 640 by 480 pictures of 256 colours in a 8- bit resolution ?

(1) 128 KB
(2) 300 KB
(3) 900 KB
(4) 1024 KB

80. Which of the following is TRUE ?

(1) Every relation in 3NF is also in BCNF

(2) A relation R is in 3NF if every non prime attribute of R is fully functionally dependent on every key of R

(3) Every relation in BCNF is also in 3NF

(4) No relation can be in both BCNF and 3NF

81. What must be the base of the number, if expression 4 +2 =11 is true ?

(1) 7 (2) 6

(3) 5 (4) 4

82. ..... input values will cause an AND logic gate to produce a HIGH output.

(1) At least one input is HIGH (2) At least one input is LOW

(3) All inputs are LOW (4) All inputs are HIGH

83. Which of the following set of gates can be used in a Full-Adder ?

(1) Two half-adders and one OR gate

(2) Two OR gates and one half-adder

(3) One half-adder and two OR gates

(4) One OR gate and one half-adder

84. Which of the following pairs have different expressive power ?

(1) Deterministic finite automata(DFA) and Non-deterministic finite automata (NFA)

(2) Deterministic push down automata(DPDA)and Non-deterministic push down automata(NPDA)

(3) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine

(4) Single-tape Turing machine and multi-tape Turing machine

85. A combinational logic circuit which is used when it is desired to send data from two or more source through a single transmission line is known as :

(1) encoder (2) decoder

(3) multiplexer (4) demultiplexer

86. Which one of the following RAID levels provides the maximum reliability of data storage ?

(1) RAID 10 (2) RAID 4

(3) RAID 5 (4) RAID 6

87. How long is an IPv4 and IPv6 address respectively ?

(1) 64 bits, 32 bits
(2) 32bits, 64 bits
(3) 128bits, 32 bits
(4) 32 bits, 128 bits

88. Which binary number represents 2' complement of the Hexadecimal number DEAF ?

(1) 0010 0001 0101 0111
(2) 1101 1110 1010 1111
(3) 0010 0001 0101 0011
(4) 0010 0001 0101 0001

89. Which of the following services use TCP ?

(i) DHCP (ii) SMTP (iii) HTTP (iv) TFTP (v) FTP

(1) (i) and (ii)
(2) (ii), (iii) and (v)
(3) (i), (ii) and (iv)
(4) (i), (iii) and (iv)

90. Identify the ***correct*** statement about the application of XML ?

(1) XML must be used to produce XML and HTML output.
(2) XML can not specify or contain presentation information
(3) XML is used to describe hierarchically organized information.
(4) XML performs the conversion of information between different e-business applications.

91. How is a J-K Flip Flop made to toggle ?

(1) J = 0, K = 0
(2) J = 1, K = 0
(3) J = 0, K = 1
(4) J = 1, K = 1

92. In which OSI layers does the FDDI protocol operate ?

(I) Physical
(II) Data link
(III) Network

(1) I and II
(2) II and III
(3) I and III
(4) None

93. Number of flip-flops used in decade counter :

(1) 3 (2) 2

(3) 4 (4) None of these

94. The Octal number equivalent of the decimal number 489 is :

(1) 750 (2) 752

(3) 329 (4) 751

95. If the size of the stack is 10 and we try to add the 11th element in the stack then the condition is known as :

(1) Underflow (2) Garbage collection

(3) Overflow (4) None

96. Your router has the following IP address on Ethernet : 172.16.2.1/23. Which of the following can be valid host IDs on the LAN interface attached to the router ?

(i) 172.16.1.100 (ii) 172.16.1.198 (iii) 172.16.2.255 (iv) 172.16.3.0

(1) (i) only

(2) (ii) and (iii) only

(3) (iii) and (iv) only

(4) None of these

97. If the baud rate is 400 for a 4-PSK signal, the bit rate is ..... bps.

(1) 1600 (2) 800

(3) 400 (4) 100

98. A binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called ..... .

(1) Lemma tree (2) Red Black tree

(3) AVL tree (4) None of the above

99. What will be the output of the following C code' ?

```
#include <stdio.h>

int main( )

{ int const a = 5;

a++;

printf("%d" ,a);

}
```

(1) 5 (2) 6

(3) Compile time error (4) Runtime error

100. Which of the following option is ***not*** correct ?

(1) If the queue is implemented with a linked list, keeping track of a front pointer, Only rear pointers will change during an insertion into an non-empty queue.

(2) Queue data structure can be used to implement least recently used (LRU) page fault algorithm and Quick short algorithm.

(3) Queue data structure can be used to implement Quick short algorithm but not least recently used (LRU) page fault algorithm.

(4) Both (1) and (3)

Answer Key of Ph.D/URS Entrance Exam 2021-22 (Computer Science/CSE)				
Q. No.	A	B	C	D
1	4	1	3	3
2	1	2	4	2
3	3	2	1	2
4	4	4	3	1
5	3	2	2	2
6	3	2	3	4
7	2	2	2	1
8	3	4	4	1
9	3	1	2	3
10	3	3	3	3
11	1	2	3	4
12	2	1	4	3
13	2	2	1	2
14	4	3	2	2
15	2	2	3	1
16	2	2	1	3
17	2	1	4	2
18	4	3	4	4
19	1	2	2	3
20	3	4	3	2
21	3	3	4	2
22	4	2	1	1
23	1	2	3	3
24	2	1	4	2
25	3	2	3	2
26	1	4	3	1
27	4	1	2	4
28	4	1	3	1
29	2	3	3	1
30	3	3	3	2
31	2	4	2	1
32	1	3	1	2
33	3	2	2	2
34	2	2	3	4
35	2	1	2	2
36	1	3	2	2
37	4	2	1	2
38	1	4	3	4
39	1	3	2	1
40	2	2	4	3
41	3	2	2	2
42	4	1	2	1
43	1	3	2	2
44	3	2	2	3
45	2	2	3	2
46	3	1	3	2
47	2	4	4	1
48	4	1	2	3
49	2	1	3	2
50	3	2	2	4

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51	4	3	2	2
52	3	4	1	2
53	2	1	3	2
54	2	2	2	2
55	1	3	2	3
56	3	1	1	3
57	2	4	4	4
58	4	4	1	2
59	3	2	1	3
60	2	3	2	2
61	2	3	3	4
62	2	4	2	4
63	2	1	2	3
64	2	3	1	2
65	3	2	2	3
66	3	3	4	2
67	4	2	1	3
68	2	4	1	2
69	3	2	3	4
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91	2	4	4	4
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93	2	3	2	3
94	3	2	2	4
95	2	3	1	3
96	2	2	3	3
97	1	3	2	2
98	3	2	4	3
99	2	4	3	3
100	4	3	2	3