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ENTRANCE EXAMINATIONS – 2023

Ph.D. in Computer Science

Time: 2 Hours **Max. Marks: 70**

Hall Ticket Number:

INSTRUCTIONS

1. Write your Hall Ticket Number in the above box **and** on the OMR Sheet.
2. This test is for **2 hours duration** carrying **70 marks**.
3. This objective type test has questions with multiple choices and has two parts: Part A contains 35 questions on Research Methodology, and Part B contains 35 questions on Computer Science. Please make sure that all the questions are clearly printed in your paper.
4. Every correct answer gets 1 **(one) mark**. There is NO negative marking.
5. All answers should be marked clearly in the OMR answer sheet only.
6. Do not use any other paper, envelope etc. for writing or doing rough work. All the rough work should be done in your question paper or on the sheets provided with the question paper at the end.
7. During the examination, anyone found indulging in copying, discussions or any other malpractice will be disqualified from the examination.
8. Use of non-programmable calculator is allowed.
9. Use of any electronic gadgets including mobile phones is **strictly prohibited** inside the hall.
10. Submit the OMR sheet to the invigilator before leaving the examination hall.

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Part A – Research Methodology

1. What is the *GPT* in ChatGPT?

   A. General Purpose Talker

   B. Generative Perceptual Transform

   C. Google Personal Transformer

   D. Generative Pretrained Transformer

2. A *perfect* number is a positive integer for which the sum of its *aliquot* factors (factors other than itself) is equal to the number itself. For example, the aliquot factors of 28 are $1, 2, 4, 7, 14$ and $1 + 2 + 4 + 7 + 14 = 28$. Therefore, 28 is a perfect number. All the *currently known* perfect numbers are of the form

   $$2^{p-1}(2^p - 1)$$

   where p is a prime. For instance, $28 = 2^{3-1}(2^3 - 1)$ and, of course, 3 is a prime. Given these facts about perfect numbers, which of the following is TRUE?

   A. *All* perfect numbers are even

   B. Every currently known perfect number can be expressed as, for some N, $\sum_{i=1}^{N} i$

   C. The last digit of every perfect number is a power of 2

   D. The smallest perfect number is 28

3. Let there be A, such that $(A \neq 0, 1)$ is the last digit of a positive integer X. If X is multiplied by a single digit number, say B, such that $(B \neq 0, 1)$ and the product also ends in the digit A, then B should be?

   A. 2

   B. 5

   C. 6

   D. 9

Questions 4 – 6 are based on the following text. Please read it carefully and answer the questions.

ACM has named Robert Metcalfe as the winner of its prestigious 2022 ACM Turing Award for the invention, standardization, and commercialization of Ethernet.

> Metcalfe's Ethernet design incorporated insights from his experience with ALOHAnet, a pioneering computer networking system developed at the University of Hawaii. Metcalfe recruited David Boggs (d. 2022), a co-inventor of Ethernet, to help build a 100-node PARC Ethernet. That first Ethernet was then replicated within Xerox to proliferate a corporate internet.
>
> "Ethernet has been the dominant way of connecting computers to other devices, to each other, and to the Internet," explains ACM President Yannis Ioannidis. "Metcalfe's original design ideas have enabled the bandwidth of Ethernet to grow geometrically. It is rare to see a technology scale from its origins to today's multigigabit-per-second capacity. Even with the advent of WiFi, Ethernet remains the staple mode of data communication, especially when security and reliability are prioritized. It is especially fitting to recognize such an impactful invention during its 50th anniversary year."
>
> "Ethernet is the foundational technology of the Internet, which supports more than 5 billion users and enables much of modern life," added Jeff Dean, Google Senior

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Fellow and SVP of Google Research and AI. "Today, with an estimated 7 billion ports around the globe, Ethernet is so ubiquitous that we take it for granted. It's easy to forget that our interconnected world would not be the same if not for Bob Metcalfe's invention and his enduring vision that every computer needed to be networked."

4. Ethernet is most commonly used for

   A. Connecting one computer to another.

   B. Connecting a computer to a peripheral device.

   C. Connecting a computer to the Internet.

   D. All of the above.

5. David Boggs is a co-inventor of the Ethernet with Robert Metcalfe. However, Boggs did not share the ACM Turing Award: why?

   A. David Boggs died in 2022.

   B. The contribution of David Boggs is much less than that of Robert Metcalfe.

   C. David Boggs implemented the first network using Ethernet but Robert Metcalfe invented the Ethernet.

   D. The contribution of David Boggs is forgotten.

6. What makes Ethernet special and uncommon?

   A. It is faster than other networking technologies.

   B. It is able to scale up even to today's multi-Gbps speeds.

   C. It is capable of handling WiFi technology.

   D. It has survived for 50 years.

7. Which among the following does NOT violate principles of research ethics?

   A. A researcher does not want to waste time and hence she submitted her research paper to two journals simultaneously for review.

   B. An author has previously published some work and plans to include substantial portion of this work, as it is, into a current paper to save time.

   C. A research scholar got a publication in a conference. She includes atleast 40% new results and submitted to a journal, citing her conference paper

   D. A research scholar submitted a paper to a conference. Once it is accepted then he wants to include his friend as a co-author.

Read the given information carefully and answer **QUESTIONS [8–9]**

Six friends I, J, K, L, M and N are sitting around a circular table. There are 3 boys and 3 girls. Following are the conditions for them to sit play the game.
(i) J is a female and has to sit between N and O.
(ii) M has to sit opposite to J.
(iii) All the boys and girls have to sit alternately.

8. Which of the following represents the 3 male members in the group?

   A. N, M, O

   B. J, L, K

   C. K, O, M

D. L, M, N

9. Which of the following statements is always TRUE?

   A. L sits opposite to O

   B. L sits next to O

   C. M is between L and K

   D. N is a girl

10. Rohit was walking on a street when one boy requested him for a donation to a cancer patients' welfare fund. He gave the boy one rupee more than half the money he had in his pocket. He walked a few more steps. Then came a girl who requested for a donation to a poor peoples fund for which he gave two rupees more than half the money he had then. Then a boy approached him for an orphanage fund donation. He gave three rupees more than half the money he had then. At last he had just one rupee remaining in his hand. How much money did Rohit have in his pocket when he started?

   A. Rs. 58

   B. Rs. 35

   C. Rs. 42

   D. Rs. 72

11. Suppose $P(x)$ is an n^{th} degree polynomial whose roots are $\{0, 1, 2, \ldots, n-1\}$. Then what is the coefficient of x^0? (Assume coefficient of x^n is one)

   A. 1

   B. $\frac{n(n+1)}{2}$

   C. 0

   D. n

12. Consider the following pairs of sets:

   I. $A_1 = \{3, 5\}$ and $A_2 = \{x : x \text{ is a solution of } x^2 + 8x + 15\}$.

   II. $B_1 = \{x : x \text{ is a letter in the word CATARACT }\}$ and $B_2 = \{y : y \text{ is a letter in the word CART }\}$

   Which of the following statements is correct?

   A. Sets in I are equal but sets in II are not

   B. Sets in II are equal but sets in I are not

   C. Sets in both I and II are equal

   D. None of the pairs of sets are equal

13. Let A and B be any two sets and $P(X)$ denotes the power set of X. Then $P(A \cap B)$ is equal to

   A. $P(A) \cap P(B)$

   B. $P(A) \cup P(B)$

   C. $P(\bar{A}) \cup P(\bar{B})$

   D. $P(\bar{A}) \cap P(\bar{B})$

14. An organization awarded 43 medals in Cricket, 28 in Football and 22 in Basketball. If these medals went to a total of 55 persons and only 3 of them got medals in all the three sports, then how many recieved medals in exactly two of the three sports?

A. 41
B. 38
C. 32
D. 43

15. If p divides $(12 \times 22 \times 35)$, which of the following CANNOT be the value of p?

A. 21
B. 28
C. 33
D. 50

16. Let $S = \{x \in (0, 2\pi] \mid xsinx - 1 = 0\}$. Then $|S|$ is

A. 0
B. 2
C. 4
D. ∞

17. Consider the set $A = \{ x \in R : (6x^2 - 20x + 6)(6x^2 - 15x + 6) < 0 \}$, then A may be written as

A. $(-\infty, 3)$
B. $(\frac{1}{3}, \frac{1}{2})$
C. $(2, 3)$
D. $(\frac{1}{3}, \frac{1}{2}) \cup (2, 3)$

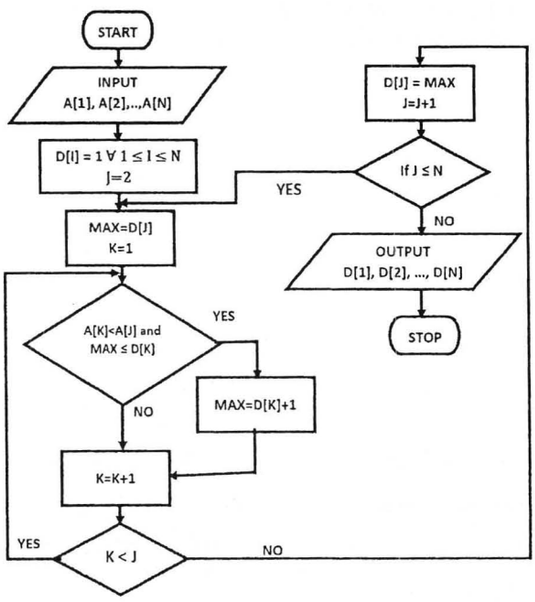
18. A clock loses 1% time during the first week and then gains 2% time during the next one week. If the clock was set right at 12 noon on a Sunday, what will be the time that the clock will show exactly 14 days from the time it was set right?

A. 1: 40: 48
B. 1: 36: 48
C. 1: 41: 24
D. 10: 19: 12

19. A number is selected at random from first thirty natural numbers. What is the chance that it is a multiple of either 3 or 13?

A. 17/30
B. 2/5
C. 11/30
D. 4/15

Study the Flow-chart given below and answer the QUESTIONS [20– 23]



20. What are the output D[] values for the input A=[24, 32, 31, 20, 20, 20]?

A. [1,2,1,1,1,1]
B. [1,2,2,1,1,1]
C. [1,2,2,2,1,1]
D. [1,1,1,1,1,1]

21. What are the output D[] values for the input A=[10, 21, 32, 44, 56, 72, 84, 85]?

A. [1,2,3,4,5,6,7,8]
B. [1,2,3,4,5,5,5,5]
C. [1,2,3,4,5,6,7,7]
D. [1,2,2,3,3,4,4,5]

22. What is the time complexity of the algorithm represented by the flow chart?

A. $O(N)$
B. $O(NlogN)$
C. $O(N^2)$
D. $O(logN)$

23. What is the value of D[4] for the input A=[100, 120, 110, 100]?

A. 2
B. 3
C. 4
D. 1

24. A *pythagorean triple* consists of three numbers a, b, c such that $a^2 + b^2 = c^2$. A *primitive* pythagorean triple is a pythagorean triple where a, b, c are *coprime*, i.e. have no common factors other than 1. Euclid showed that we can get a pythagorean triple by picking two numbers m and n ($m > n$) that are coprime and then generate

$$\begin{aligned} a &= m^2 - n^2 \\ b &= 2mn \\ c &= m^2 + n^2 \end{aligned}$$

Let us pick two *odd numbers* m and n that are coprime; then which of the following is TRUE?

A. They generate a primitive pythagorean triple

B. They generate a non-primitive pythagorean triple

C. If $m - n = 2$, they generate a primitive pythagorean triple

D. If $n = m/2$, they do not generate a primitive pythagorean triple.

25. Palindromes (text that reads the same forward and backward), e.g. *madam, racecar* and palindromic sentences, e.g. *do geese see god* are often used in puzzles and recreation. A person observes that a certain palindromic sentence has an *odd* number of unique letters. What can we say about the length of the sentence?

A. The length is an odd number

B. The length is an even number

C. The length is a multiple of an odd number

D. We cannot say anything about the length from the information given

26. A random variable X follows log-normal distribution if its logarithm has a normal distribution. Then the graph of the probability density function may best be described as:

A. has a long right-hand tail

B. has a long left-hand tail

C. looks like Normal distribution

D. looks like uniform distribution

27. A man from the city wishes to visit his relatives in 6 villages. All the villages are well-connected by road. The number of different ways he may visit the villages without visiting any village twice is

A. 120

B. 720

C. 520

D. 30

28. For Boolean variables P, Q and R, which of the following are Tautologies?

I. $[\, P \vee (Q \wedge R)\,] \leftrightarrow [\, (P \vee Q) \wedge (P \vee R)\,]$

II. $[\, P \vee (Q \wedge R)\,] \leftrightarrow [\, (P \wedge Q) \vee (P \wedge R)\,]$

III. $(P \rightarrow Q) \leftrightarrow [\, \neg(P \vee Q)\,]$

IV. $\neg(P \vee Q) \leftrightarrow [\, \neg P \rightarrow \neg Q\,]$

A. All of I, II, III and IV
B. I, II, III only
C. I, III, IV only
D. I and III only

29. For Boolean variables P, Q and R, which among the following are True?

I. $[\,(\neg P \vee Q) \wedge (P \vee R)\,] \equiv (Q \vee R)$
II. $[\,(\neg P \wedge Q) \vee (P \wedge Q)\,] \equiv Q$

A. Both I and II
B. Only I
C. Only II
D. Neither I nor II

30. Which of the following hardware companies manufacture processors with X86 instruction set?

I. ARM
II. AMD
III. INTEL
IV. NVIDIA

A. I and II only
B. II and III only
C. III and IV only
D. All of them

31. Consider the following sequence of 3-bit binary numbers:

$$(000, 001, 011, 010, 110, 111, 101, 100)$$

What is the best description given to this code?

A. 3-bit binary code
B. 3-bit Gray code
C. Binary Coded Decimal(BCD) number
D. One's complement of BCD

32. Consider the word "Complement". In the context of digital systems, this commonly means:

A. A kind of praise or admiration
B. The total number that makes a group complete
C. To produce a logic value at the output which is the same as at the input
D. To produce a logic value at the output which is the opposite of the input

33. A popular document preparation software for technical documents in academia is LaTeX. In fact, this question paper is typeset using it. What is the origin of the name LaTeX?

A. Latest extension of TeX

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B. Large annotated TEX

C. Lamport's TEX

D. Los Angeles TEX extensions

34. Given that the probability density function of a random variable X is given by

$$f(x) = \begin{cases} kx & 0 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

Then the value of k is

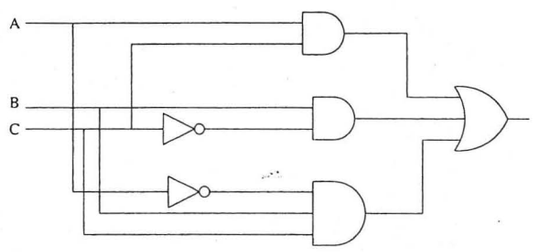
A. $\frac{1}{3}$

B. 1

C. $\frac{1}{4}$

D. $\frac{1}{2}$

35. Which of the following Boolean expression represents the logic gate given below:



A. AC+B$\bar{C}$+$\bar{A}$BC

B. A$\bar{C}$+B$\bar{C}$+AB$\bar{C}$

C. AC+$\bar{B}$C+$\bar{A}$BC

D. A$\bar{B}$+$\bar{B}\bar{C}$+$\bar{A}\bar{B}$C

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TURN THE PAGE FOR PART B $\longrightarrow$

Part – B: Computer Science

36. Consider the process states in an operating system. Which of the following state transitions cannot be possible for a process in a conventional operating system?

    A. Ready to Running
    B. Blocked to Running
    C. Blocked-Suspend to Ready-Suspend
    D. Running to Ready

37. Which of the following measures to improve system performance should be most effective to prevent thrashing in a system?

    A. Use the next generation CPU
    B. Increase degree of multiprogramming
    C. Increase memory
    D. All of the above

38. If a 32-bit processor system has pages of size 16KB, what could be the maximum number of entries in the page table?

    A. 2^{20}
    B. 2^{21}
    C. 2^{16}
    D. 2^{18}

39. A file is 8MB in size. The disk on which it is stored has 4KB block size. How many index blocks are needed to store this file if each disk block entry takes 4B?

    A. 2^{11} blocks
    B. 2^{12} blocks
    C. 2 blocks
    D. 4 blocks

40. A process has been allocated 3 page frames. Assume that none of the pages of the process are available in the memory initially. The process makes the following sequence of page references (reference string): 1, 2, 1, 3, 7, 4, 5, 6, 3, 1
    If optimal page replacement policy is used, how many page faults occur for the following reference string?

    A. 10
    B. 9
    C. 8
    D. 7

41. Which of the following describes TCP's congestion control algorithm?

    A. Multiplicative Increase, Multiplicative Decrease
    B. Multiplicative Increase, Additive Decrease
    C. Additive Increase, Multiplicative Decrease

D. Additive Increase, Additive Decrease

42. Which of the following is achieved by having the *TTL* field in the IP header?

I. Prevent infinite looping of the packet
II. Reduce Congestion
III. Achieve Flow Control

A. I and III
B. I only
C. I and II
D. All of the above

43. If the polynomial used for the Cyclic Redundancy Check (CRC) of a MAC protocol is $x^{63} + x^{61} + x^{32} + x^{15} + x^7 + x^3 + x^2 + 1$, how many bits are included in the CRC checksum of the frame for such a protocol?

A. 64
B. 63
C. 32
D. 128

44. Consider Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 500 kbps, R2 = 2 Mbps, and R3 = 1 Mbps. Assuming no other traffic in the network, what is the throughput for the file transfer?

A. 200 kbps
B. 500 kbps
C. 2 Mbps
D. Mbps

45. What is the maximum number of edges possible in a simple bipartite graph of 601 vertices?

A. 90300
B. 361201
C. 600
D. Infinity (No upper bound)

46. In a directed acyclic graph(DAG) $G = (V, E)$, suppose $f(u, v) = \text{indeg}(u) + \text{outdeg}(v)$ for $u, v, \in V$. What is the minimum possible value of f?

A. Always 0
B. Not always 0
C. Strictly positive
D. Depends on the graph

47. A hard disk supports block size of 4096 bytes. Consider a file containing 30000 records. Size of a record is 400 bytes. If a binary search is done on the data file, how many block accesses are required?

A. 10

B. 12

C. 16

D. 18

48. Which of the following problem occurs in a transaction schedule where an updated item (by failed transaction) is accessed by another transaction before it is changed back to its original value?

A. The lost update problem.

B. The incorrect summary problem

C. The temporary update (or Dirty read) problem

D. None of these

49. COMMIT in databases usually means that

I. A user is permanently saving all changes made in the transaction of a database or table.

II. After COMMIT is executed the database may easily go back to its previous state

III. After COMMIT is executed database cannot go back to its previous state.

Which of the above are correct?

A. I. and II. only

B. I. and III. only

C. None of I., II. and III. are correct

D. Only III.

50. Consider a relation $R(A, B, C, D, E)$ with 5 attributes. It is given that the only keys are A and B. Then how many super keys are possible?

A. 8

B. 24

C. 31

D. 32

51. Assume a binary tree is a strict binary tree in which a non-leaf node has non-empty left and right subtrees. If the number of leaf nodes in the tree is 10, then what is the total number of nodes in the tree?

A. 16 nodes

B. 17 nodes

C. 18 nodes

D. 19 nodes

52. Prefix traversal order of a tree is *+ab-cd. Its equivalent post-fix order of a tree is

A. abcd+-*

B. ab+cd*-

C. ab+cd-*

D. ab+-cd*

53. Consider an unordered list constructed as a linked list. Arrange the list by manipulating links so that all zeroes are moved to the front. How many links are manipulated in total? Given that
Input: 1, 0, 1, 0, 1, 1, 0
Output : 0, 0, 0, 1, 1, 1

A. 6

B. 0

C. 5

D. 7

54. Consider the following procedure of constructing the min-Heap $A[1 \cdots n]$, where `Insert` maintains heap property

```
for k = 2 to n
Insert A[k] into the heap A[1...k-1]
```

What is the time complexity of this procedure?

A. $\Theta(n)$

B. $\Theta(logn)$

C. $\Theta(n/logn)$

D. $\Theta(n\ logn)$

55. What is the lower bound on the time complexity of the comparison based sorting algorithms?

A. $O(n\ logn)$

B. $O(n\ (logn)^2)$

C. $O(n)$

D. $O(logn)$

56. Let $\mathcal{F}$ be a set of all functions. Relations R_1, R_2 and R_3 are such that each of them are subsets of $\mathcal{F} \times \mathcal{F}$ and
$(f, g) \in R_1$ if $f = O(g)$
$(f, g) \in R_2$ if $f = \Omega(g)$
$(f, g) \in R_3$ if $f = \Theta(g)$
where 'O', Ω and Θ stand for the standard asymptotic notation.

Which of the following statements are true?

I. All R_1, R_2 and R_3 are transitive

II. All R_1, R_2 and R_3 are symmetric

III. All R_1, R_2 and R_3 are reflexive

IV. R_3 is an equivalence relation

A. I, II and IV only

B. I, II and III only

C. II, III and IV only

D. I, III and IV only

57. If there is a polynomial time reduction from problem A to problem B and problem B to problem C. Then which statements are definitely true?

I. If C is polynomial time solvable then both A and B are also polynomial time solvable
II. If A is polynomial time solvable then both B and C are polynomial time solvable
III. If A is NP-Hard both B and C are NP-Hard
IV. If C is NP-Hard then both A and B are NP-Hard.

A. I and IV only
B. II and IV only
C. I and III only
D. II and III only

58. Consider the recurrence $F(n) = 2F(n/2) + (n-2)$, $F(1) = 1$ and $n = 2^k$. Which is the best form for $F(n)$?

A. $n(log_2 n - 1) + 2$
B. $nlogn$
C. $nlog_2 n + 2$
D. $log_2 n + 2$

59. Which of the following statements is FALSE.

A. Fractional-Knapsack problem can be solved optimally by a greedy algorithm
B. 0/1-Knapsack problem can be solved optimally by a greedy algorithm
C. All pairs shortest paths problem can be solved optimally by a greedy algorithm
D. All pairs shortest paths problem can be solved optimally by the dynamic programming strategy

60. A valid coloring of a graph $G = (V, E)$ is an assignment of colors to vertices of G such that no two adjacent vertices get the same color. $\chi(G)$ denotes the minimum number of colors required for a valid coloring of G.
Which of the following statements is FALSE for $n \geq 3$?

A. χ(Complete graph K_n) $= n$
B. χ(Path graph P_n) $= 2$
C. χ(Cycle graph C_{2n}) $= 3$
D. χ(Cycle graph C_{2n+1}) $= 3$

61. The language $L = \{a^n b^n c^n \mid 13 \leq n \leq 119\}$ over the alphabet $\Sigma = \{a, b, c\}$ is

A. regular
B. not regular, but context-free
C. not context free, but recursive
D. not recursive, but recursively enumerable

62. Consider the following context-free grammar with S as the start symbol
$S \rightarrow BC|DB$
$A \rightarrow a$
$B \rightarrow bC|c$
$C \rightarrow CB|DC|CA$
$D \rightarrow d$
Which of the five non-terminals is/are useless?

A. C only

B. D only

C. A and C only

D. A and D only

63. Choose a Context Free Grammar(CFG) on $\Sigma = \{a, b, c\}$ that generates the language

$$\{a^i b^j c^k : j = i + k, i, j, k \geq 0\}$$

A. $S \to A$
$A \to aAb \mid bAc \mid \epsilon$

B. $S \to AB$
$A \to aAb \mid \epsilon$
$B \to bBc \mid \epsilon$

C. $S \to ABC$
$A \to aAb \mid \epsilon$
$B \to bBc \mid \epsilon$
$C \to cC \mid \epsilon$

D. $S \to aSbScS \mid \epsilon$

64. Which of the following regular expressions do NOT generate strings containing the substring 00?

A. 0(10)*(011)*

B. 0(10)1*(01)*

C. 1(10)*(10)*(01)*

D. 1*(01)*(01)*(11)*

65. Consider two microprocessors having 8-bit and 16-bit-wide external data buses, respectively. The two processors are identical otherwise and their bus cycles take just as long. Suppose one fourth of the operands and instructions are one byte long and the rest are two bytes long. By what factor do the maximum data transfer rates differ?

A. 1.75

B. 1.25

C. 17.5

D. 12.5

66. A computer has a cache, main memory, and a disk used for virtual memory. If a referenced word is in the cache, 20 ns are required to access it. If it is in main memory but not in the cache, 120 ns are needed to load it into the cache, and then the reference is started again. If the word is not in main memory, 12 ms are required to fetch the word from disk, followed by 60 ns to copy it to the cache, and then the reference is started again. The cache hit ratio is 0.9 and the main memory hit ratio is 0.6. What is the average time in nanoseconds required to access a referenced word on this system?

A. 20

B. 480005.6

C. 1200089

D. 480029.6

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67. Consider a processor that includes a base with indexing addressing mode. Suppose an instruction is encountered that employs this addressing mode and specifies a displacement of 1970, in decimal. Currently the base and index register contain the decimal numbers 48022 and 8, respectively. What is the address of the operand?

A. 1978

B. 46060

C. 49992

D. 50000

68. Consider the following 'C' program:

```
#include <stdio.h>
function(int t)
 {
        char *array[] = {"0000","0001","0010","0011","0100","0101","0110","0111","1000",
        "1001","1010","1011","1100","1101","1110","1111"};

        unsigned char* c = (unsigned char*) &t ;
        c+=3;
        for (int i = 0; i < sizeof t; i++)
                {       int d = (*c)>>4;
                        printf("%s", array[d]);
                        d = (*c) & 0xf;
                        printf("%s ", array[d]);
                        c--;
                 }
 }
int main()
{
 int t=4;
 function(t);
}
```

If the least significant bytes are stored before the more significant bytes then the output is:

A. 00000000 00000000 00000000 00000100

B. 00000100 00000000 00000000 00000000

C. 00000000 00000100 00000000 00000000

D. 00000000 00000000 00000100 00000000

69. What is the output for the following 'C' program

```
#include <stdio.h>
int main()
{
    int  a[5], i, b = 16 ;
    for ( i = 0 ; i < 5 ; i++ )
        a[i] = 2 * i ;
```

```
    function ( a, b ) ;

    for ( i = 0 ; i < 5 ; i++ )
        printf ( "\n%d", a[i] ) ;
    printf( "\n%d", b ) ;
}
    function ( int  *x, int  y )
        {  int  i ;
                for ( i = 0 ; i < 5 ; i++ )
                *( x + i ) += 2 ;  y += 2 ;
                }
```

A. 2, 4, 6, 8, 10, 16

B. 2, 4, 6, 8, 12,16

C. 4, 6, 12, 32, 34,16

D. 2,4,8, 10, 12, 16

70. In general,which 'C' programming functions are expected to be faster for reading binary data from files and writing binary data to files.

A. fgets() and fputs()

B. fread() and fwrite()

C. fscanf() and fprintf()

D. fget() and fput()

END

University of Hyderabad

Ph.D. Entrance Examinations - 2023

School/~~Department/Centre~~ : COMPUTER and Information Sciences

Course : Ph.D. Subject : COMPUTER SCIENCE.

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	D	26	A	51	D
2	B	27	A	52	C
3	C	28	D	53	A
4	D	29	C	54	D
5	A	30	B	55	A
6	B	31	B	56	D
7	C	32	D	57	C
8	A	33	C	58	A
9	C	34	D	59	B
10	C	35	A	60	C
11	C	36	B	61	A
12	B	37	C	62	C
13	A	38	D	63	B
14	C	39	C	64	D
15	D	40	D	65	A
16	B	41	C	66	D
17	D	42	C	67	D
18	A	43	B	68	A
19	B	44	B	69	A
20	B	45	A	70	B
21	A	46	A		
22	C	47	B		
23	D	48	C		
24	B	49	B		
25	D	50	B		

Note/Remarks :

Signature 26/6/2023

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