GATE 2025 Computer Science Shift 2 Question Paper

Time Allowed :3 hours	Maximum Marks :100	Total questions :65

General Instructions

Read the following instructions very carefully and strictly follow them:

This question paper is divided into three sections:

1. The total duration of the examination is 3 hours. The question paper contains three sections -

Section A: General Aptitude

Section B: Engineering Mathematics

Section C: Chemical Engineering

2. The total number of questions is **65**, carrying a maximum of **100 marks**.

3. The marking scheme is as follows:

(i) For 1-mark MCQs, $\frac{1}{3}$ mark will be deducted for every incorrect response.

(ii) For 2-mark MCQs, $\frac{2}{3}$ mark will be deducted for every incorrect response.

(iii) No negative marking for numerical answer type (NAT) questions.

4. No marks will be awarded for unanswered questions.

5. Follow the instructions provided during the exam for submitting your answers.

1. Given N distinct elements in an array, determine the number of comparisons required to find the element which is not the largest:

(A) $2N - 1$

(B) $N - 1$

(C) 0

(D) 1

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2. Consider the following code:

```
main() {
  int x = 126, y = 105;
  {
    if (x > y)
      x = x - y;
    else
      y = y - x;
  }
  while (x != y)
    printf("%d", x);
}
```

What is the output?

(A) 21

(B) 105

(C) 126

(D) 0

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3. In a binary search tree with the following elements: $10, -4, 15, 13, 20, 5, 16, 19$, the number of edges from node 19 to the root is?

(A) 3

(B) 4

(C) 2

(D) 5

4. Consider the following code:

```c
int a;
int arr[] = {30, 50, 10};
int *ptr = &arr[10] + 1;
a = *ptr;
(*ptr)++;
ptr = ptr + 1;
printf("%d", a + arr[1] + *ptr);
```

What is the output?

(A) 100

(B) 110

(C) 111

(D) 120

---

5. Consider the following hierarchical cache system with the following access times:

Cache Level	Hit Rate	Access Time
$L1$	90%	1 ns
$L2$	80%	10 ns
$L3$	100%	100 ns

Find T_{avg} for hierarchical or simultaneous access.

(A) $3.7\,\text{ns}$

(B) $4\,\text{ns}$

(C) $5\,\text{ns}$

(D) $6\,\text{ns}$

---

6. Consider a binary tree in which every node has either 0 or 2 children. Let $N > 0$ be the number of nodes in the tree. The number of nodes that have exactly 2 children is:

(A) $\frac{N+1}{2}$

(B) $\frac{N-2}{2}$

(C) $\frac{N}{2}$

(D) $\frac{N-1}{2}$

---

7. Given the sequence: $5, 6, 15, \_, 89, 170, 291$**, find the missing number.**

(A) 30

(B) 35

(C) 40

(D) 45

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8. Bird: Nest :: Bee: ____?

(A) Hive

(B) Colony

(C) Den

(D) Burrow

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9. Given a pipeline with 5 stages, the delay for each stage is as follows:

Stage	Delay (ns)
1	250
2	150
3	100
4	200
5	50

The buffer delay is 10 ns. Find the time for $n = 1000$ instructions.

(A) 261.040 microseconds

(B) 200.050 microseconds

(C) 150.030 microseconds

(D) 100.020 microseconds

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10. Given the following cache parameters:

Tag	4 bits
Index	12 bits
Block Size	1 byte

Find the size of the main memory and the size of the cache memory.

(A) 64 KB, 4 KB

(B) 128 KB, 8 KB

(C) 256 KB, 16 KB

(D) 512 KB, 32 KB

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11. Consider the following process information for Shortest Remaining Time First (SRTF) scheduling:

Process	Arrival Time (AT)	Burst Time (BT)
$P1$	0	10
$P2$	1	13
$P3$	2	6
$P4$	8	9

Find the turnaround time for each process.

(A) 19

(B) 20

(C) 18

(D) 15

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12. Consider the following C code:

```
int main() {
    sum = 0;
    for (n = 1; n < 3; n++) {
        n++;
        sum += g(f(n));
    }
```

```c
    printf("%d", sum);
}


int g(n) {
    return 10 + n;
}


int f(n) {
    return g(2 * n);
}
```

What is the output?

(A) 40

(B) 46

(C) 50

(D) 30

---

13. What is included in the Instruction Set Architecture (ISA)?

(A) Number of Registers

(B) Clock Cycle Time or Frequency of CPU

(C) Number of Cache Levels

(D) Cache Size

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14. In an IPv4 packet, if X is written in the protocol field, which of the following is not a valid protocol X?

(A) IGMP

(B) ICMP

(C) RIP

(D) OSPF

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15. Given the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$, find A^8.

(A) $625I$

(B) $625A$

(C) I

(D) $25I$

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16. Let L, M, and N be non-singular matrices of size 3×3, such that $L^2 = L^{-1}$, $M = L^8$, and $N = L^2$. Find $|M - N|$.

(A) 0

(B) 1

(C) 2

(D) 3

---

17. Given that the integral $I = \int_x^i \log t \, dt = \frac{1}{4}$, find the value of x.

(A) $\sqrt{e}$

(B) e

(C) 1

(D) 2

---

18. Given the following information:

Logical address space $= 2^{32}$,   Page size $= 2084$ bytes,   PTE size $= 8$ bytes,   2-level paging system.

Calculate the number of bits required to search in the outer level page table.

(A) 2^8

(B) 2^9

(C) 2^{10}

(D) 2^7

---

19. Given an array $A[n]$ such that:

$A[0] \to A[i]$ is in non-decreasing order, $A[i + 1] \to A[n]$ is in non-increasing order.

Find the time complexity to find $A[i]$.

(A) $O(N)$

(B) $O(\log_2 N)$

(C) $O(\log n \times \log n)$

(D) $O(1)$

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20. In the case of a 4-bit ripple counter, if the time period of the waveform at the last flip-flop is 64 microseconds, what is the input frequency?

(A) 250 KHz

(B) 125 KHz

(C) 500 KHz

(D) 2 KHz