

GATE (CS)

Sample Question Paper - 2023

Country: IN | Duration: 3 hours | Max Marks: 100 | Language: English

Negative Marking: Yes (-1/3) | Total Questions: 65 | QuizVerse AI Tutor

General Instructions:

1. This paper contains 65 questions across 2 section(s): Computer Science & IT, Engineering Mathematics.
2. Duration: 3 hours. Maximum marks: 100.
3. Negative marking: Yes (-1/3).
4. Read each question carefully before answering.

Section 1: Computer Science & IT (45 Questions)

Q1. The purpose of NAT in networking is:

- (A) Error detection
- (B) IP address translation
- (C) Encryption
- (D) Routing

Q2. Which sorting algorithm has best-case $O(n)$?

- (A) Insertion Sort
- (B) Quick Sort
- (C) Merge Sort
- (D) Heap Sort

Q3. Paging eliminates:

- (A) Internal fragmentation
- (B) Both
- (C) External fragmentation
- (D) Neither

Q4. The three levels of data abstraction are:

- (A) Low, Medium, High
- (B) None of these
- (C) Physical, Logical, View
- (D) Class, Object, Method

Q5. TCP is a ____ protocol:

- (A) Connectionless
- (B) Stateless
- (C) Connection-oriented
- (D) Broadcast

Q6. TCP is a ____ protocol:

- (A) Connectionless
- (B) Broadcast
- (C) Stateless
- (D) Connection-oriented

Q7. B+ tree is commonly used in:

- (A) Database indexing
- (B) Graph traversal
- (C) Sorting
- (D) Hashing

Q8. DNS resolves:

- (A) Domain names to IP addresses
- (B) IP to MAC
- (C) Port to service
- (D) MAC to IP

Q9. In a complete binary tree with n nodes, the height is:

- (A) $O(\sqrt{n})$
- (B) $O(n)$
- (C) $O(1)$
- (D) $O(\log n)$

Q10. A language is regular if and only if it is accepted by:

- (A) LBA
- (B) Finite Automaton
- (C) Turing Machine
- (D) PDA

Q11. The halting problem is:

- (A) Decidable
- (B) NP-complete
- (C) Undecidable
- (D) Regular

Q12. TCP is a ____ protocol:

- (A) Stateless
- (B) Connection-oriented
- (C) Broadcast
- (D) Connectionless

Q13. The halting problem is:

- (A) NP-complete
- (B) Decidable
- (C) Undecidable
- (D) Regular

Q14. The three levels of data abstraction are:

- (A) None of these
- (B) Class, Object, Method
- (C) Physical, Logical, View
- (D) Low, Medium, High

Q15. In SQL, which keyword eliminates duplicates?

- (A) UNIQUE
- (B) DIFFERENT
- (C) DISTINCT
- (D) REMOVE

Q16. Which normal form eliminates transitive dependencies?

- (A) 2NF
- (B) 3NF
- (C) 1NF
- (D) BCNF

Q17. In SQL, which keyword eliminates duplicates?

- (A) REMOVE
- (B) UNIQUE
- (C) DIFFERENT
- (D) DISTINCT

Q18. The number of edges in a complete graph with n vertices is:

- (A) $2n$
- (B) n^2
- (C) $n(n-1)/2$
- (D) $n-1$

Q19. The subset sum problem is:

- (A) Regular
- (B) P
- (C) Undecidable
- (D) NP-complete

Q20. The purpose of NAT in networking is:

- (A) Routing
- (B) Encryption
- (C) IP address translation
- (D) Error detection

Q21. Paging eliminates:

- (A) Internal fragmentation
- (B) Both
- (C) External fragmentation
- (D) Neither

Q22. Dijkstra's algorithm does not work with:

- (A) Sparse graphs
- (B) Dense graphs
- (C) Negative edge weights
- (D) Undirected graphs

Q23. Which data structure uses LIFO?

- (A) Array
- (B) Stack
- (C) Queue
- (D) Linked List

Q24. In a complete binary tree with n nodes, the height is:

- (A) $O(\log n)$
- (B) $O(n)$
- (C) $O(\sqrt{n})$
- (D) $O(1)$

Q25. In OOP, polymorphism allows:

- (A) Same interface, different implementations
- (B) No overriding
- (C) Single class only
- (D) Multiple inheritance only

Q26. In C, the size of int on a 64-bit system is typically:

- (A) 4 bytes
- (B) 2 bytes
- (C) 1 byte
- (D) 8 bytes

Q27. The number of edges in a complete graph with n vertices is:

- (A) $n(n-1)/2$
- (B) $n-1$
- (C) n^2
- (D) $2n$

Q28. In OOP, polymorphism allows:

- (A) Same interface, different implementations
- (B) Single class only
- (C) Multiple inheritance only
- (D) No overriding

Q29. Which traversal visits root first?

- (A) Level order
- (B) Inorder
- (C) Preorder
- (D) Postorder

Q30. Which layer of OSI handles routing?

- (A) Data Link
- (B) Physical
- (C) Network
- (D) Transport

Q31. The time complexity of binary search is:

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

Q32. A language is regular if and only if it is accepted by:

- (A) LBA
- (B) Finite Automaton
- (C) PDA
- (D) Turing Machine

Q33. A semaphore is used for:

- (A) Process synchronization
- (B) Disk scheduling
- (C) File management
- (D) Memory allocation

Q34. Which sorting algorithm has best-case $O(n)$?

- (A) Insertion Sort
- (B) Merge Sort
- (C) Heap Sort
- (D) Quick Sort

Q35. TCP is a ____ protocol:

- (A) Connectionless
- (B) Connection-oriented
- (C) Broadcast
- (D) Stateless

Q36. Which data structure uses LIFO?

- (A) Stack
- (B) Queue
- (C) Linked List
- (D) Array

Q37. A semaphore is used for:

- (A) Process synchronization
- (B) Memory allocation
- (C) Disk scheduling
- (D) File management

Q38. Which scheduling algorithm may cause starvation?

- (A) Round Robin
- (B) SJF (non-preemptive)
- (C) FCFS
- (D) Priority Scheduling

Q39. The time complexity of binary search is:

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

Q40. The number of edges in a complete graph with n vertices is:

- (A) $2n$
- (B) $n-1$
- (C) $n(n-1)/2$
- (D) n^2

Q41. In C, the size of int on a 64-bit system is typically:

- (A) 8 bytes
- (B) 4 bytes
- (C) 1 byte
- (D) 2 bytes

Q42. DNS resolves:

- (A) Port to service
- (B) MAC to IP
- (C) IP to MAC
- (D) Domain names to IP addresses

Q43. Which data structure uses LIFO?

- (A) Queue
- (B) Stack
- (C) Array
- (D) Linked List

Q44. Which normal form eliminates transitive dependencies?

- (A) BCNF
- (B) 3NF
- (C) 2NF
- (D) 1NF

Q45. Dijkstra's algorithm does not work with:

- (A) Sparse graphs
- (B) Negative edge weights
- (C) Dense graphs
- (D) Undirected graphs

Section 2: Engineering Mathematics (20 Questions)

Q46. $\lim_{x \rightarrow 0} \sin(7x)/x =$

- (A) 4
- (B) 4
- (C) 4
- (D) 2

Q47. The rank of the matrix $\begin{bmatrix} 1,2,3 \\ 4,5,6 \\ 9,11,12 \end{bmatrix}$ is:

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

Q48. The area under $y = x^3$ from $x = 0$ to $x = 2$ is:

- (A) 94.6
- (B) 71.6
- (C) 137.9
- (D) 196.8

Q49. Integral of $(x^2 + 2) dx$ from 0 to 2 equals:

- (A) 84
- (B) 29
- (C) 51
- (D) 16

Q50. If $z = 4 + 4i$, then $|z| =$

- (A) 7.91
- (B) 1.47
- (C) 8.61
- (D) 2.14

Q51. The number of ways to arrange 4 distinct objects in a circle is:

- (A) 505
- (B) 1530
- (C) 1702
- (D) 2588

Q52. If $z = 3 + 2i$, then $|z| =$

- (A) 8.84
- (B) 6.37
- (C) 7.60
- (D) 6.73

Q53. The number of ways to arrange 3 distinct objects in a circle is:

- (A) 4780
- (B) 4720
- (C) 4483
- (D) 3264

Q54. The derivative of $x^4 \sin(x)$ at $x = \pi$ is:

- (A) 18.16
- (B) 3.97
- (C) 18.38
- (D) -19.82

Q55. Integral of $(x^2 + 1) dx$ from 0 to 2 equals:

- (A) 7
- (B) 91
- (C) 36
- (D) 99

Q56. If $\det(A) = 3$ and A is 3×3 , then $\det(2A) =$

- (A) 89
- (B) 40
- (C) 35
- (D) 57

Q57. The number of ways to arrange 4 distinct objects in a circle is:

- (A) 1459
- (B) 3983
- (C) 315
- (D) 4671

Q58. The rank of the matrix $\begin{bmatrix} 1,2,3 \\ 4,5,6 \\ 7,11,11 \end{bmatrix}$ is:

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

Q59. The area under $y = x^3$ from $x = 0$ to $x = 4$ is:

- (A) 107.9
- (B) 55.6
- (C) 142.5
- (D) 71.0

Q60. The derivative of $x^2 \sin(x)$ at $x = \pi$ is:

- (A) -3.62
- (B) 5.21
- (C) 14.84
- (D) 2.14

Q61. The equation of tangent to $y = x^2$ at $x = 1$ is:

- (A) $y = 6x - 7$
- (B) $y = 5x - 11$
- (C) $y = 4x - 4$
- (D) $y = 2x - 5$

Q62. The sum of first 24 terms of AP with $a = 3$, $d = 4$ is:

- (A) 4404
- (B) 4396
- (C) 784
- (D) 4128

Q63. The equation of tangent to $y = x^2$ at $x = 1$ is:

- (A) $y = 8x - 10$
- (B) $y = 3x - 1$
- (C) $y = 8x - 3$
- (D) $y = 12x - 13$

Q64. $\lim_{x \rightarrow 0} \sin(4x)/x =$

- (A) 5
- (B) 5
- (C) 6
- (D) 3

Q65. The probability of getting exactly 4 heads in 8 tosses of a fair coin is:

- (A) $5/64$
- (B) $12/256$
- (C) $29/128$
- (D) $39/128$

Answer Key

Q1: (B)	Q2: (A)	Q3: (C)	Q4: (C)	Q5: (C)
Q6: (D)	Q7: (A)	Q8: (A)	Q9: (D)	Q10: (B)
Q11: (C)	Q12: (B)	Q13: (C)	Q14: (C)	Q15: (C)
Q16: (B)	Q17: (D)	Q18: (C)	Q19: (D)	Q20: (C)
Q21: (C)	Q22: (C)	Q23: (B)	Q24: (A)	Q25: (A)
Q26: (A)	Q27: (A)	Q28: (A)	Q29: (C)	Q30: (C)
Q31: (A)	Q32: (B)	Q33: (A)	Q34: (A)	Q35: (B)
Q36: (A)	Q37: (A)	Q38: (D)	Q39: (A)	Q40: (C)
Q41: (B)	Q42: (D)	Q43: (B)	Q44: (B)	Q45: (B)
Q46: (A)	Q47: (C)	Q48: (C)	Q49: (A)	Q50: (B)
Q51: (C)	Q52: (C)	Q53: (D)	Q54: (C)	Q55: (A)
Q56: (C)	Q57: (A)	Q58: (A)	Q59: (B)	Q60: (D)
Q61: (A)	Q62: (B)	Q63: (D)	Q64: (A)	Q65: (B)

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