# GATE 2025

## COMPUTER SCIENCE & INFORMATION TECHNOLOGY

### Questions & Solutions

1st Feb Forenoon Session

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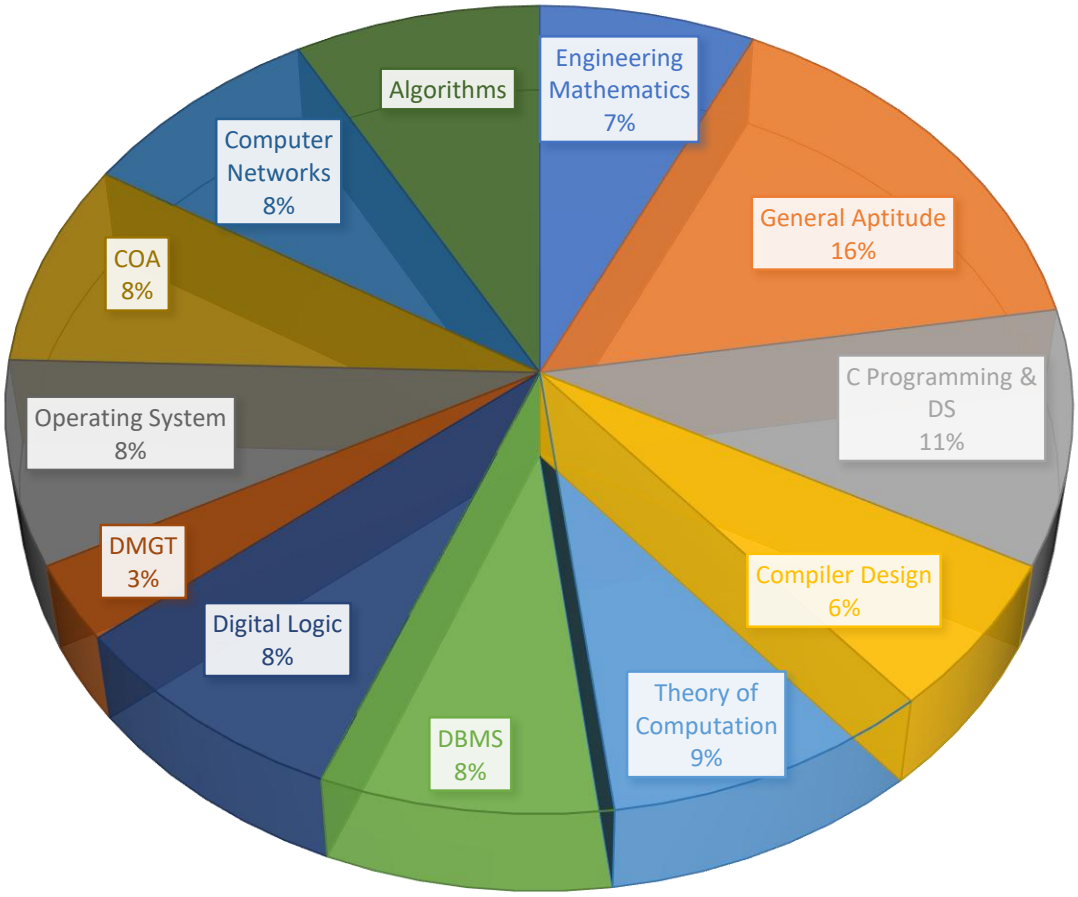
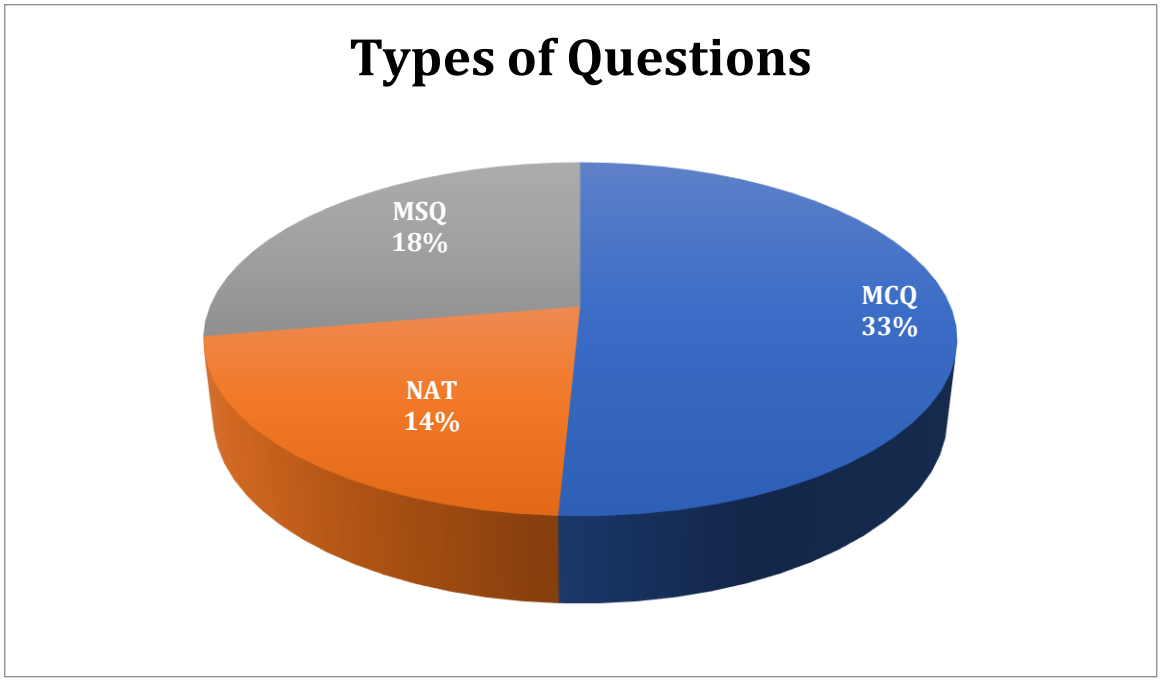
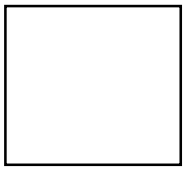
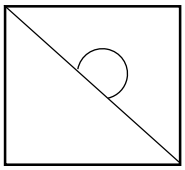


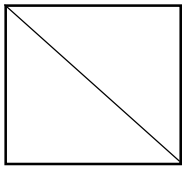


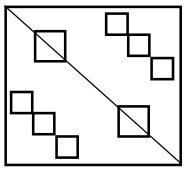
## SECTION - A GENERAL APTITUDE

1. Paper folding

(A) 

(B) 

(C) 

(D) 

**Correct Option: ***

**0 Mark**

## SECTION - B TECHNICAL

1.
```
void foo(int * P, int x)
{
  * P = x;
}
int main( )
{
    int * z;
    int a = 20 , b = 25;
    z = & a;
    foo(z, b);
    printf("%d", a) ;
    return 0;
}
```

**Correct Option: 25** **1 Mark**

2.
```
int main( ){
int A[ ] = {0, 1, 2, 2, 2, 0, 0, 1, 1};
printf("%d", foo(A, 9));
return 0;
}
int foo(int S[ ], int size){
if(size == 0)  return 0;
if (size == 1) return 1;
if(S[0]! = S[1] return (1 + foo(S + 1, size − 1))
return (foo(S + 1, size − 1))
```

**Correct Option: 5** **2 Mark**

3. **Pseudocode:**

```
fun(int A[0 ... ... . . n − 1])
for i = 0  to n − 2
   for j = 0 to n − i − 2
   if (A[j] > A[j + 1])
   swap A[j]and A[j + 1]
```

A[0 ... ... .29] be an array of size 30 distant integers in descending order.
No. of swap operations = _____

**Correct Option: 435** **2 Mark**

4. The height of any rooted tree is defined as the max no. of edges in the path from the root node to any key node. Suppose a min heap T store 32 keys, then the height of the tree T_____?

**Correct Option: 5** **1 Mark**

5.
```
int main ( ){ printf("%d", gate (14362);  return 0; }
int gate(int n)
{
    int d, t, newnum, turn;
    newnum = turn = 0, t = 1;
    while(n >= t) t *= 10;
      t/ = 10;
    while(t > 0)
    {
    d = n/t;
    n = n%t;
    t/ = 10;
    if(turn) newnum = 10 * newnum + d;
    turn = (turn + 1)%2
    }
    return newnum;
}
```

**Correct Option: 46** — **2 Mark**

6. Which one of the following techniques used in compiler code optimization uses live variable analysis?

(A) Constant folding
(B) Runtime function call management
(C) Register Assignment to variables
(A) Strength Reduction

**Correct Option: *** — **0 Mark**

7.

| Subnet Address | / | Interface |
|---|---|---|
| 145.36.0.0 | /16 | $E_1$ |
| 145.36.128.0 | /17 | $E_2$ |
| 145.36.64.0 | /18 | $E_3$ |
| 145.36.253.0 | /24 | $E_4$ |
| | | Default |

IP Add: 145.36.169.70

**Correct Option: 3** **0 Mark**

8. 3 way hand shaking for connection establishment

$P_1, P_2, P_3$ are in order

(A) $P_2$: SYN = 1, ACK = 1

(B) $P_3$ = SYN = 1, ACK = 1

(C) $P_1$: SYN = 1

(A) $P_2$: SYN = 0, ACK = 1

**Correct Option: A & C** **0 Mark**

9. Souce$\underset{\text{MTU = 5000 Byte}}{\overset{R_1}{\text{_____}}}\underset{\text{MTU = 3000 Byte}}{\overset{R_2}{\text{_____}}}$Destination.

**Correct Option: *** **0 Mark**

10. When interrupt arrives, CORRECT sequence of instruction?

$P_1$ content of PC load into the stack.

$P_2$ load interrupt service add on the PC.

$P_3$ complete the current instruction execution.

**Correct Option: $P_3P_1P_2$** **0 Mark**

11. Logical address = 32 bits

Physical address = 20 bits

Page size = 2KB or 2048 bytes

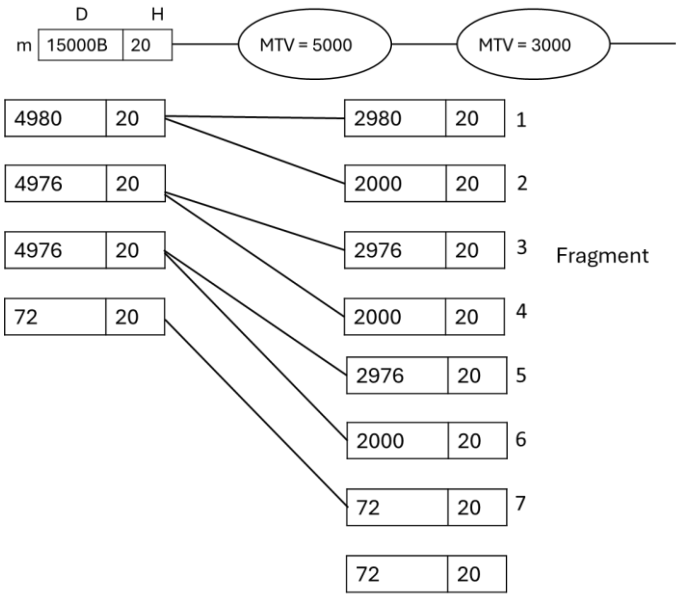
= 2”

Maximum of P.T. entries = ? = no. of pages

**Correct Option: ***

**0 Mark**

12.




**Correct Option:***

**0 Mark**

13. Mm = 1Mbyte, Cache = 16 kB, Block size = 16 Byte

Direct Map ping  Tag m/m size = ?

**Correct Option: *** **0 Mark**

14. Interrupt:

If any interrupt occurs?

P1 = content of PC stored on stack

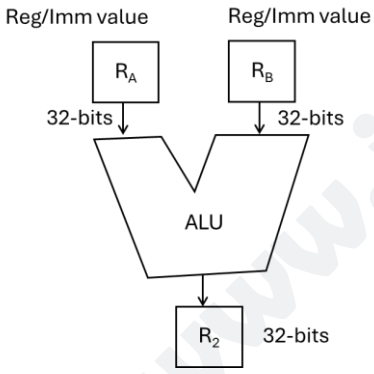
P2 = Load interrupt service address onto program

P3 = Complete current installation execution

Correct sequence?

**Correct Option: *** **0 Mark**

15. What $R_A$ and $R_B$ can contains?




(A) Reg & Rmm value

(B) Reg & Reg value

(C) Imm & Imm value

(D) Only Reg & Imm

**Correct Option: A, B & C** **0 Mark**

16. Which of the following is/are true for BST with n distinct elements

(A) Finding $0(\log_2 n)$

(B) Inorder → Sorted sequence

(C) Max number of edges from root Node to any Node is $n - 1$

(D) BST is also min heap

**Correct Option: B & C** **1 Mark**

17. $T(n) = 2T(n-1) + n \cdot 2^n, T(0) = 1$

(A) $\theta(n^2 \times 2^n)$

(B) $\theta(\log n)^2 \times 2^n$

(C) $\theta(n \times 2^n)$

(D) $\theta(4^n)$

**Correct Option: A** **2 Mark**

18. A language L is accepted by NFA with n states. Which of the following is/are false.

(A) Every DFA that accepts $L > 2^n$ states

(B) L may have NFA $< n$ states

(C) Three exist DFA with $\leq 2^n$ sates for L

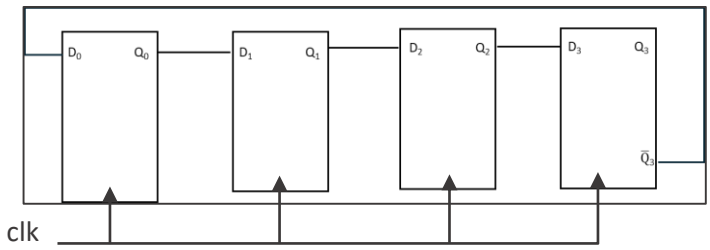
(D) L may have DFA $< n$ states

**Correct Option: A** **1 Mark**

19. The max values of x such the edge between BC is included in every MST of given graph

**Correct Option: 5** **2 Mark**

20.




MOD no $= 2 \times 4 = 8$

8 check pulsses

**Correct Option: ***

**0 Mark**

21. $-6$ in 16 bit 2's complement?

**Correct Option: ***

**0 Mark**

22. The minimized function of F (A, B, C, D) $= \Sigma m(0,2,4,8,10,11,12)$ is

**Correct Option: ***

**0 Mark**

23. Consider a demand pages system,

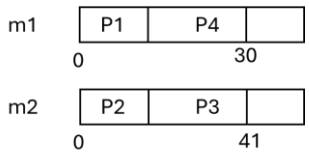
Given : LA $= 32$ bit, PA $= 20$ bit, Page size $= 2048$B

Page table Entries $= ?$

**Correct Option: ***

**0 Mark**

24. M1, M2




M1 : P1 > P3 > P2 > P4

M2 : P2 > P3 > P4 > P1

(A) 7.5

(B) 9.0

(C) 6.5

(D) 8.75

**Correct Option: B** **2 Mark**

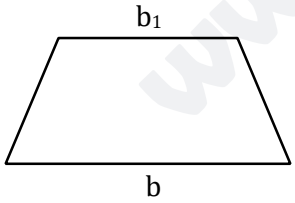
25. If $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$ the eigen values of $A^{13} = ?$

**Correct Option: *** **0 Mark**

26. A dice is thrown three time P(exactly one 6)

**Correct Option: 25/72** **0 Mark**

27. Find the ratio of area




**Correct Option: *** **0 Mark**

28. Find the value of $\int_2^4 \frac{3}{63} x^2 dx$

**Correct Option: *** **0 Mark**

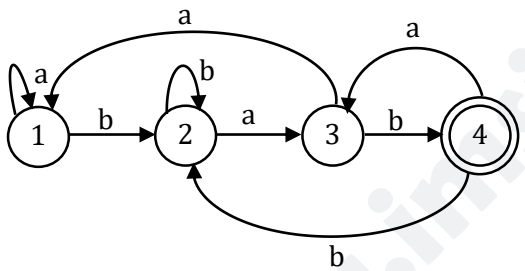
29. If 5 bit are transmitted & probability of flipping the bit is 0.01 then what is the probability that the message received is error free?

**Correct Option: 0.951** **1 Mark**

30. $f(n) = \begin{cases} ax + b & , x = 1 \\ x^3 + x^2 + 1, & x \geq 1 \end{cases}$ is different than b = ?

**Correct Option: *** **0 Mark**

31.




Language = Set of all strings ending with bab

**Correct Option: *** **0 Mark**

32. Given Table (Name, City, Owner)

FD's Name → City

Name → Owner

The given table decomposed into two sub relation T1(Name, City) & /T2 (Name, Owner). Which of the following is/are correct?

(A) Table relation is not in 3NF

(B) Table relation not in BCNF

(C) T1 & T2 in BCNF

(D) T1 & T2 are lose less join decomposition

**Correct Option: C & D** **2 Mark**

33.

| Player | | |
|---|---|---|
| $P_{id}$ | $P_{name}$ | $P_{age}$ |
| 1 | Jasprit | 31 |
| 2 | Rohit | 24 |
| 3 | Ishan | 26 |
| 4 | Axar | 30 |

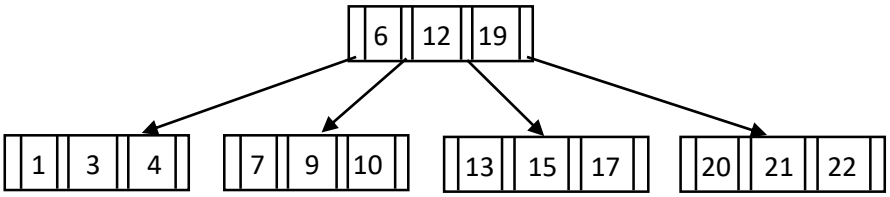
| Coach | |
|---|---|
| $C_{id}$ | $C_{name}$ |
| 101 | Rickey |
| 102 | Mark |
| 103 | Travor |
| | |

| Team | | | |
|---|---|---|---|
| $t_{id}$ | $t_{name}$ | City | $C_{id}$ |
| 10 | MI | Mum | 102 |
| 20 | DC | Del | 101 |
| 30 | PK | Moh | 103 |
| | | | |

| Member | |
|---|---|
| $P_{id}$ | $t_{id}$ |
| 1 | 10 |
| 2 | 30 |
| 3 | 10 |
| 4 | 20 |

**Correct Option: 26** **2 Mark**

34. Consider B+ tree with 5 nodes and 9 node can have almost 3 keys




If we insert key: 23

(A) The height of the tree will increase

(B) Atleast one node splitting

(C) No node splitting

(D) None of these

**Correct Option: A & B** **2 Mark**

35. Sch(s): $R_1(x)\ w_1(y)\ R_2(x)\ R_2(y)\ R_3(y)$ ABORT($T_1$) other trans need to rollback?

(A) Only $T_3$

(B) Both $T_2$ and $T_3$

(C) Only $T_2$

(D) Neither $T_2$ nor $T_3$

**Correct Option: B** **2 Mark**

36. Consider following grammar

$S \rightarrow aaB|Abb$

$A \rightarrow a|aA$

$B \rightarrow b|bB$

Language = ?

(A) $\{a^n b^{2n}\} \cup \{a^{2n} b^n\}$

(B) $\{a^2 b^n\} \cup \{a^n b^2\}$

(C) $\{a^n b^n\}$

(D) $\{a^{2n} b^{2n}\}$

**Correct Option: B** **0 Mark**

37. $G = (V_1, E)$, $T = MST$

$d_1(4, V) \Rightarrow$ Shortest path between 2 nodes in G.

$d_2(4, V) \Rightarrow$ Shortest path between 2 nodes in T.

(A) $d_1 \leq d_2$

(B) $d_1 != d_2$

(C) $d_1 > d_2$

(D) $d1 \geq d_2$

**Correct Option: A** **0 Mark**

38. Let G be any UG with two edges and T be a MST of G. For any two vertices u, v, let $d_1(u, v)$ and $d_2(u, v)$ be the shortest distance between (u, v) in G and in T respectively.

(A) $d_1(u, v) = d_2(u, v)$

(B) $d_1(u, v) \geq d_2(u, v)$

(C) $d_1(u, v) \neq d_2(u, v)$

(D) $d_2(u, v) \leq d_2(u, v)$

**Correct Option: *** **0 Mark**

39. Let G(V, E) be an undirected and unconnected graph with 100 vertices. Let d(u, v) denote (U, V $\epsilon$ V) the # edges in shortest path between u and v. Let the maximum value of d(u, v) s.t u $\neq$ v, be 30. Let T be a BFS transversal of G. Which of _____.

The height of T is _____.

(A) Exactly 30

(B) Exactly 15

(C) Atleast 15

(D) Atleast 30

**Correct Option: *** **0 Mark**