CS-COMPUTER SCIENCE AND IMFORMATION TECHNOLOGY

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2011

Duration:Three hours   Maximum Marks:150

Q. 1 – Q. 25 carry one mark each.

1) In a compiler, keywords of a language are recognized during   **(GATE EE 2025)**

   a) parsing of the program   c) the lexical analysis of the program
   b) the code generation   d) dataflow analysis

2) A layer-4 firewall (a device that can look at all protocol headers up to the transport layer) **CANNOT** **(GATE EE 2025)**
   a) block entire HTTP traffic during 9:00PM and 5:00AM
   b) block all ICMP traffic
   c) stop incoming traffic from a specific IP address but allow outgoing traffic to the same IP address
   d) block TCP traffic from a specific user on a multi-user system during 9:00PM and 5:00AM

3) If two fair coins are flipped and at least one of the outcomes is known to be a head, what is the probability that both outcomes are heads?   **(GATE EE 2025)**
   a) $\frac{1}{3}$
   b) $\frac{1}{4}$
   c) $\frac{1}{2}$
   d) $\frac{2}{3}$

4) Consider different activities related to email.
   m1: Send an email from a mail client to a mail server
   m2: Download an email from mail server to a mail client
   m3: Checking email in a web browser
   Which is the application level protocol used in each activity?   **(GATE EE 2025)**
   a) m1: HTTP   m2: SMTP   m3: POP
   b) m1: SMTP   m2: FTP   m3: HTTP
   c) m1: SMTP   m2: POP   m3: HTTP
   d) m1: POP   m2: SMTP   m3: IMAP

5) A company needs to develop a strategy for software product development for which it has a choice of two programming languages L1 and L2. The number of lines of code (LOC) developed using L2 is estimated to be twice the LOC developed with L1. The product will have to be maintained for five years. Various parameters for the company are given in the table below.

Parameter	Language L1	Language L2
Man years needed for development	LOC/10000	LOC/10000
Maintenance time	5 years	5 years

   Total cost of the project includes cost of development and maintenance. What is the LOC for L1 for which the cost of the project using L1 is equal to the cost of the project using L2?**(GATE EE 2025)**
   a) 4000

b) 5000

c) 4333

d) 4667

6) Let the time taken to switch between user and kernel modes of execution be t_1, while the time taken to switch between two processes be t_2. Which of the following is **TRUE**?   **(GATE EE 2025)**

a) $t_1 > t_2$

b) $t_1 = t_2$

c) $t_1 < t_2$

d) nothing can be said about the relation between t_1 and t_2

7) A company needs to develop digital signal processing software for one of its newest inventions. The software is expected to have 40000 lines of code. The company needs to determine the effort in person-months needed to develop this software using the basic COCOMO model. The multiplicative factor for this model is given as 2.8 for the software development on embedded systems, while the exponentiation factor is given as 1.20. What is the estimated effort in person-months? **(GATE EE 2025)**

a) 234.25

b) 932.50

c) 287.80

d) 122.40

8) Which of the following pairs have **DIFFERENT** expressive power?   **(GATE EE 2025)**

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

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

c) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine

d) Single-tape Turing machine and multi-tape turing machine

9) HTML (HyperText Markup Language) has language elements which permit certain actions other than describing the structure of the web document. Which one of the following actions is **NOT** supported by pure HTML (without any server or client side scripting) pages?   **(GATE EE 2025)**

a) Embed web objects from different sites into the same page

b) Refresh the page automatically after a specified interval

c) Automatically redirect to another page upon download

d) Display the client time as part of the page

10) Which one of the following is **NOT** desired in a good Software Requirement Specifications (SRS) document?   **(GATE EE 2025)**

a) Functional Requirements

b) Non-Functional Requirements

c) Goals of Implementation

d) Algorithms for Software Implementation

11) A computer handles several interrupt sources, which of the following are relevant for this question:
Interrupt from CPU temperature sensor (raises interrupt if CPU temperature is too high)
Interrupt from Mouse (raises interrupt if the mouse is moved or a button is pressed)
Interrupt from Keyboard (raises interrupt when key is pressed or released)
Interrupt from Hard Disk (raises interrupt when a disk read is completed)
Which one of these will be handled at the **HIGHEST** priority?   **(GATE EE 2025)**

a) Interrupt from Hard Disk

b) Interrupt from Mouse

c) Interrupt from Keyboard

d) Interrupt from CPU temperature sensor

12) Consider a relational table with a single record for each registered student with the following attributes

1. Registration_Nam: Unique registration number of each registered student
2. UID: Unique identity number ,unique at national level for each citizen
3. BankAccount_Num:Unique account number at bank
4. Name:name of the student
5. Hostel_Room: Room number of the hostel

Which of the following is **INCORRECT ?** **(GATE EE 2025)**

   a) BankAccount_Num is a candidiate key
   b) Registration_Num can be a primary key
   c) UID is a candidiate key if all the students are from same country
   d) If S is a superkey such that $S \cap UID$ is NULL then $S \cap UID$ is also a superkey

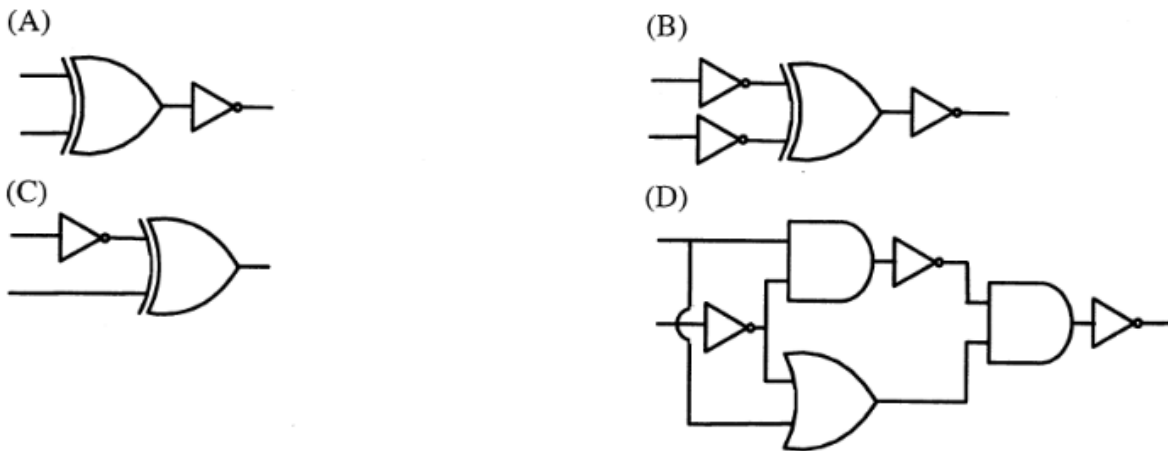13) Which one of the following circuits is **NOT** equivalent to a 2-input XNOR (*exclusiveNOR*) gate? **(GATE EE 2025)**

(A)

(B)

(C)

(D)

Fig. 13.

14) The simplified SOP (Sum of Products) form of the Boolean expression

$$(P + \overline{Q} + R) \cdot (P + \overline{Q} + \overline{R}) \cdot (P + Q + \overline{R})$$

   is **(GATE EE 2025)**

   a) $(\overline{PQ} + \overline{R})$
   b) $(P + \overline{Q}\,\overline{R})$
   c) $(\overline{PQ} + R)$
   d) $(PQ + R)$

15) The minimum number of D flip-flops needed to design a mod-258 counter is: **(GATE EE 2025)**

   a) 9   b) 8   c) 512   d) 258

16) A thread is usually defined as a "light weight process" because an operating system (OS) maintains smaller data structures for a thread than for a process. In relation to this, which of the following is **TRUE**? **(GATE EE 2025)**

   a) On per-thread basis, the OS maintains *only* CPU register state
   b) The OS does not maintain a separate stack for each thread
   c) On per-thread basis, the OS does not maintain virtual memory state
   d) On per-thread basis, the OS maintains *only* scheduling and accounting information

17) K4 and Q3 are graphs with the following structures.
Which one of the following statements is TRUE in relation to these graphs? **(GATE EE 2025)**
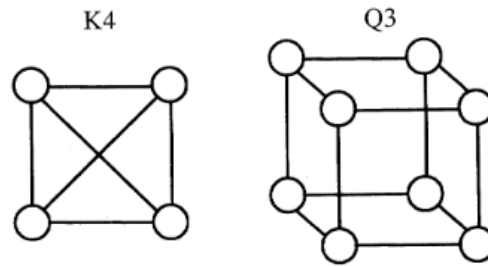
K4   Q3

Fig. 17. Caption

a) K4 is planar while Q3 is not
b) Both K4 and Q3 are planar
c) Q3 is planar while K3 is not
d) Neither K4 nor Q3 is planar

18) If the difference between the expectation of the square of a random variable $E[X^2]$ and the square of the expectation of the random variable $(E[X])^2$ is denoted by R, then **(GATE EE 2025)**

a) $R = 0$
b) $R < 0$
c) $R \geq 0$
d) $R > 0$

19) The lexical analysis for a modern computer language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense? **(GATE EE 2025)**

a) Finite state automata
b) Deterministic pushdown automata
c) Non-deterministic pushdown automata
d) Turing machine

20) Let the page fault service time be 10 ms in a computer with average memory access time being 20 ns. If one page fault is generated for every 10^6 memory accesses, what is the effective access time for the memory? **(GATE EE 2025)**

a) 21 ns
b) 30 ns
c) 23 ns
d) 35 ns

21) Consider a hypothetical processor with an instruction of type LW R1, 20(R2), which during execution reads a 32-bit word from memory and stores it in a 32-bit register R1. The effective address of the memory location is obtained by the addition of a constant 20 and the contents of register R2. Which of the following best reflects the addressing mode implemented by this instruction for the operand in memory? **(GATE EE 2025)**

a) Immediate Addressing
b) Register Addressing
c) Register Indirect Scaled Addressing
d) Base Indexed Addressing

22) What does the following fragment of C program print?

```
char c[] = "GATE2011";
char *p = c;
printf("%s", p + p[3] − p[1]);
```

a) GATE2011
b) E2011
c) 2011
d) 011

23) A max-heap is a heap where the value of each parent is greater than or equal to the value of its children. Which of the following is a max-heap ? **(GATE EE 2025)**
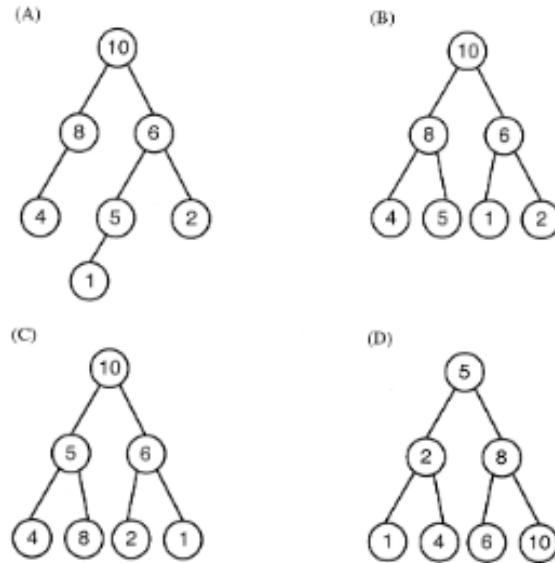

Fig. 23.

24) Let P be a regular language and Q be a context-free language such that $Q \subseteq P$. (For example, let P be the language represented by the regular expression p^* and $Q = \{p^n \mid n \in \mathbb{N}\}$). Then which of the following is **ALWAYS** regular? **(GATE EE 2025)**

a) $P \cap Q$
b) $P - Q$
c) $\Sigma^* - P$
d) $\Sigma^* - Q$

25) An algorithm is to find the length of the longest monotonically increasing sequence of numbers in an array $A[0 : n - 1]$ is given below.

Let L_i denote the length of the longest monotonically increasing sequence starting at index i in the array.

For all i such that $0 \leq i \leq n - 2$,

$$L_i = \begin{cases} 1 + L_{i+1} & \text{if } A[i] < A[i + 1] \\ 1 & \text{Otherwise} \end{cases}$$

Finally, the length of the longest monotonically increasing sequence is $\max(L_0, L_1, \ldots, L_{n-1})$.
Which of the following statements is **TRUE**? **(GATE EE 2025)**

a) The algorithm uses dynamic programming paradigm
b) The algorithm has a linear complexity and uses branch and bound paradigm
c) The algorithm has a linear and non-polynomial complexity and uses branch and bound paradigm
d) The algorithm uses divide and conquer paradigm

26) Consider the languages L_1, L_2, and L_3 as given below.

$$L_1 = \{0^n 1^n \mid p, q \in \mathbb{N}\}$$

$$L_2 = \{0^p 1^q \mid p, q \in \mathbb{N} \text{ and } p = q\}$$

$$L_3 = \{0^p 1^q \mid p, q \in \mathbb{N} \text{ and } p \neq q\}$$

Which of the following statements is **NOT TRUE**?　　　　　　　　　　**(GATE EE 2025)**
   a) Push Down Automata (PDA) can be used to recognize L_1 and L_2
   b) L_1 is a regular language
   c) All the three languages are context-free
   d) Turing machines can be used to recognize all the languages

27) Consider two binary operators '↑' and '↓' with the precedence of operator '↓' being lower than that of the operator '↑'. Operator '↑' is **right associative** while operator '↓' is **left associative**.
   Which one of the following represents the parse tree for expression $(7 \downarrow 3 \uparrow 1) \uparrow (3 \downarrow 2)$?　　**(GATE EE 2025)**
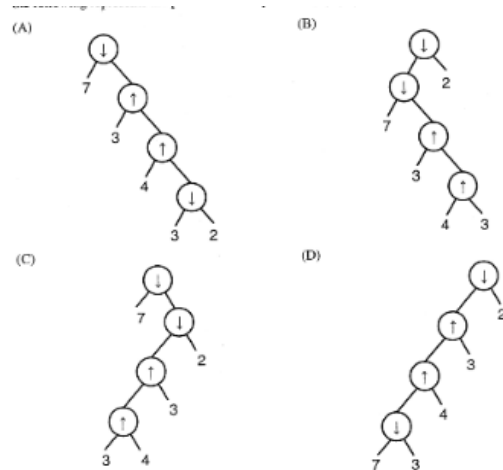

Fig. 27.

28) On a non-pipelined sequential processor, a program segment, which is a part of the interrupt service routine, is given to transfer 500 bytes from an I/O device to memory.

```
     Initialize the address register
     Initialize the count to 500
LOOP: Load a byte from device
     Store in memory at address given by address register
     Increment the address register
     Decrement the count
     If count != 0 go to LOOP
```

Assume that each statement in this program is equivalent to a machine instruction which takes one clock cycle to execute if it is a non-load/store instruction. The load-store instructions take two clock cycles to execute.
The designer of the system also has an alternate approach of using the DMA controller to implement the same transfer. The DMA controller requires 20 clock cycles for initialization and other overheads.

Each DMA transfer cycle takes two clock cycles to transfer one byte of data from the device to the memory.
What is the approximate speedup when the DMA controller based design is used in place of the interrupt driven program based input-output? **(GATE EE 2025)**

a) 3.4   b) 4.4   c) 5.1   d) 6.7

29) We are given a set of n distinct elements and an unlabeled binary tree with n nodes. In how many ways can we populate the tree with the given set so that it becomes a binary search tree? **(GATE EE 2025)**

a) 0   b) 1   c) n!   d) $\binom{2n-2}{n-1}$

—

30) Which one of the following options is CORRECT given three positive integers x, y and z, and a predicate

$$P(x) = (\neg(x = 1) \wedge \forall y(\exists z(x = y \cdot z) \Rightarrow (y = x) \vee (y = 1)))$$

(GATE EE 2025)

a) P(x) being true means that x is a prime number
b) P(x) being true means that x is a number other than 1
c) P(x) is always true irrespective of the value of x
d) P(x) being true means that x has exactly two factors other than 1 and x

31) Given $i = \sqrt{-1}$, what will be the evaluation of the definite integral

$$\int_0^{2\pi} \frac{\cos x + i \sin x}{\cos x - i \sin x} dx?$$

(GATE EE 2025)

a) 0   b) 2   c) -i   d) i

32) Consider a database table T containing two columns X and Y each of type `integer`. After the creation of the table, one record ($X = 1, Y = 1$) is inserted in the table.
Let MX and MY denote the respective maximum values of X and Y among all records in the table at any point in time. Using MX and MY, new records are inserted in the table 128 times with X and Y values being $MX + 1, 2 \cdot MY + 1$ respectively. It may be noted that each time after the insertion, values of MX and MY change.
What will be the output of the following SQL query after the steps mentioned above are carried out? **(GATE EE 2025)**
`SELECT Y FROM T WHERE X=7;`

a) 127   b) 255   c) 129   d) 257

33) Consider a finite sequence of random values $X = [x_1, x_2, \ldots, x_n]$. Let μ_x be the mean and σ_x be the standard deviation of X. Let another finite sequence Y of equal length be derived from this as $y_i = ax_i + b$, where a and b are positive constants. Let μ_y be the mean and σ_y be the standard deviation of this sequence. Which one of the following statements is **INCORRECT**? **(GATE EE 2025)**
a) Index position of mode of X in X is the same as the index position of mode of Y in Y.
b) Index position of median of X in X is the same as the index position of median of Y in Y.
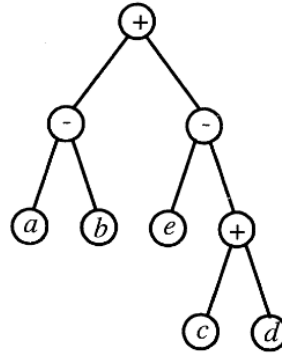c) $\mu_y = a\mu_x + b$

Fig. 36.

d) $\sigma_y = a\sigma_x + b$

34) A deck of 5 cards (each carrying a distinct number from 1 to 5) is shuffled thoroughly. Two cards are then removed one at a time from the deck. What is the probability that the two cards are selected with the number on the first card being one higher than the number on the second card? **(GATE EE 2025)**

a) 1/5   b) 4/25   c) 1/4   d) 2/5

35) Consider the following table of arrival time and burst time for three processes P0, P1 and P2.

Process	Arrival time (ms)	Burst time (ms)
P0	0	8
P1	1	4
P2	2	9

The pre-emptive shortest job first scheduling algorithm is used. Scheduling is carried out only at arrival or completion of processes. What is the average waiting time for the three processes? **(GATE EE 2025)**

a) 5.0 ms   b) 4.33 ms   c) 6.33 ms   d) 7.33 ms

36) Consider evaluating the following expression tree on a machine with load-store architecture in which memory can be accessed only through load and store instructions. The variables a, b, c, d are initially stored in memory. The binary operators used in this expression tree can be evaluated by the machine only when the operands are in registers. The instructions produce results only in a register. If no intermediate results can be stored in memory, what is the minimum number of registers needed to evaluate this expression? **(GATE EE 2025)**

a) 2   b) 9   c) 5   d) 3

37) Which of the given options provides the increasing order of asymptotic complexity of functions f_1, f_2, f_3 and f_4?

$$f_1(n) = 2^n, \quad f_2(n) = n^{3/2}, \quad f_3(n) = n \log n, \quad f_4(n) = n^{\log_2 n}$$
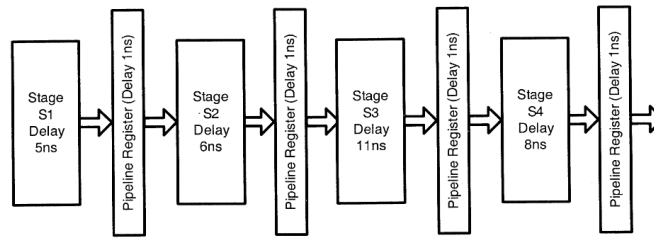
(GATE EE 2025)

Fig. 41.

a) f_3, f_2, f_4, f_1 c) f_2, f_3, f_1, f_4
b) f_2, f_3, f_4, f_1 d) f_3, f_2, f_1, f_4

38) Four matrices M_1, M_2, M_3 and M_4 of dimensions $p \times q$, $q \times r$, $r \times s$, $s \times t$ respectively can be multiplied in several ways with different number of total scalar multiplications. For example when multiplied as $(((M_1 M_2)M_3)M_4)$, the total number of scalar multiplications is $pqr + prs + pst$. When multiplied as $((M_1(M_2 M_3))M_4)$, the total number of scalar multiplications is $pqr + rst + prt$. What is the minimum number of scalar multiplications needed if

$$p = 10, \ q = 100, \ r = 20, \ s = 5, \ t = 80?$$

(GATE EE 2025)

a) 248000   b) 44000   c) 19000   d) 25000

39) Consider a relational table r with sufficient number of records, having attributes $A_1, A_2, \ldots, A_n$ and let $1 \le p \le n$. Two queries Q1 and Q2 are given below.

$$\text{Q1: } \pi_{A_1, \ldots, A_p}(\sigma_{A_p = c}(r)) \quad \text{where } c \text{ is a constant}$$

$$\text{Q2: } \pi_{A_1, \ldots, A_p}(\sigma_{c_1 \le A_p \le c_2}(r)) \quad \text{where } c_1 \text{ and } c_2 \text{ are constants}$$

The database can be configured to do ordered indexing on A_p or hashing on A_p. Which of the following statements is **TRUE**?   **(GATE EE 2025)**
a) Ordered indexing will always outperform hashing for both queries.
b) Hashing will always outperform ordered indexing for both queries.
c) Hashing will outperform ordered indexing on Q1, but not on Q2.
d) Hashing will outperform ordered indexing on Q2, but not on Q1.

40) Consider the matrix as given below.

$$\begin{pmatrix} 1 & 2 & 3 \\ 0 & 4 & 7 \\ 0 & 0 & 3 \end{pmatrix} \qquad (1)$$

Which one of the following options provides the **CORRECT** values of the eigenvalues of the matrix?
(GATE EE 2025)

a) 1, 4, 3   b) 3, 7, 3   c) 7, 3, 2   d) 1, 2, 3

41) Consider an instruction pipeline with four stages (S1, S2, S3 and S4) each with combinational circuit only. The pipeline registers are required between each stage and at the end of the last stage. Delays for the stages and for the pipeline registers are as given in the figure.
What is the approximate speed up of the pipeline in steady state under ideal conditions when compared to the corresponding non-pipeline implementation?   **(GATE EE 2025)**

a) 4.0   b) 2.25   c) 1.1   d) 3.0

42) Definition of a language **L** with alphabet $\{a\}$ is given as follows:
$L = \{a^k \mid k > 0,\ k$ is a positive integer constant
What is the minimum number of states needed in a DFA to recognize L?   **(GATE EE 2025)**

a) $k + 1$ b) $n + 1$ c) 2^{k+1} d) 2^{n+1}

43) An 8KB direct-mapped write-back cache is organized as multiple blocks, each of size 32 bytes. The processor generates 32-bit addresses. The cache controller maintains the tag information for each cache block comprising of the following:
What is the total size of memory needed at the cache controller to store meta-data (tags) for the cache?   **(GATE EE 2025)**

a) 4864 bits   b) 6144 bits   c) 6656 bits   d) 5376 bits

44) An application loads 100 libraries at startup. Loading each library requires exactly one disk access. The seek time of the disk to a random location is given as 10 ms. Rotational speed of disk is 6000 rpm. Transfer rate of disk is 4 MB/s. Assume that average seek time and rotational latency are incurred only once, and all 100 libraries are loaded from random locations on the disk. How long will it take to load all libraries? (The time to transfer data from the disk block once the head has been positioned at the start of the block may be neglected.)   **(GATE EE 2025)**

a) 0.50 s   b) 1.50 s   c) 1.25 s   d) 1.00 s

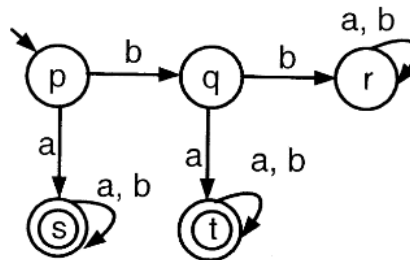45) A deterministic finite automaton (DFA) D with alphabet $\Sigma = \{a, b\}$ is given below.   **(GATE EE 2025)**

Fig. 45.

Which of the following finite state machines is a valid minimal DFA which accepts the same language as **D**?   **(GATE EE 2025)**
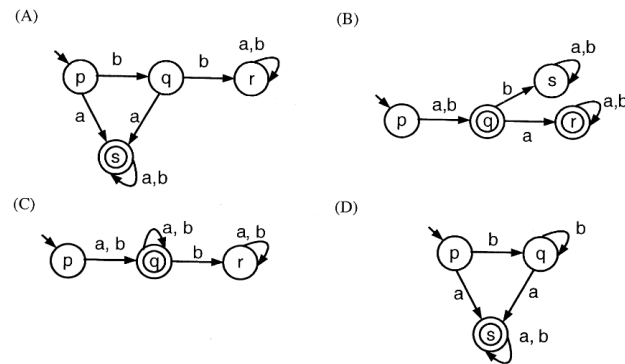
Fig. 45.

46) Database table by name `Loan_Records` is given below. **(GATE EE 2025)**

Borrower	Bank_Manager	Loan_Amount
Ramesh	Sundergarjan	10000.00
Suresh	Ramgopal	5000.00
Mahesh	Sundergarjan	7000.00

What is the output of the following SQL query?

```
SELECT count(*)
FROM (
    (SELECT Borrower, Bank_Manager FROM Loan_Records) AS S
    NATURAL JOIN
    (SELECT Bank_Manager, Loan_Amount FROM Loan_Records) AS T
);
```

a) 3   b) 9   c) 5   d) 6

47) The following is the comment written for a C function.

```
/* This function computes the roots of a quadratic equation
   a*x^2 + b*x + c = 0. The function stores two real roots
   in *root1 and *root2 and returns the status of validity
   of roots. It handles four different kinds of cases.
   (i)  When coefficient a is zero irrespective of discriminant
   (ii) When discriminant is positive
   (iii) When discriminant is zero
   (iv) When discriminant is negative.
   Only in case (ii) and (iii), the stored roots are valid.
   Otherwise 0 is stored in the roots. The function returns
   0 when the roots are valid and -1 otherwise.
   The function also ensures root1 >= root2.
*/
 int get_QuadRoots(float a, float b, float c, float *root1, float *root2);
```

A software test engineer is assigned the job of doing black box testing. He comes up with the following test cases, many of which are redundant.

Test Case	a	b	c	Expected root1, root2	Return Value
T1	0	0	7	(0.0, 0.0)	−1
T2	1	0	0	(0.0, 0.0)	0
T3	1	2	1	(−1.0, −1.0)	0
T4	1	0	−12	(3.0, −3.0)	0
T5	1	−2	−3	(3.0, −1.0)	0
T6	1	0	4	(0.0, 0.0)	−1

Which one of the following options provide the set of non-redundant tests using equivalence class partitioning approach from input perspective for black box testing? **(GATE EE 2025)**

a) T1, T2, T3, T6

c) T2, T4, T5, T6

b) T1, T3, T4, T5

d) T2, T3, T4, T5

Common Data Questions
Common Data for Questions 48 and 49:
Consider the following recursive C function that takes two arguments.

```
unsigned int foo(unsigned int n,unsigned int int r){
     if (n>0) return ((n%r) + foo(n/r,r));
     else return 0;
}
```

48) What is the return value of the function foo when it is called as foo(345,10) ?   **(GATE EE 2025)**

a) 345   b) 12   c) 5   d) 3

49) What is the return value of the function foo when it is called as foo(513,2)?   **(GATE EE 2025)**

a) 9   b) 8   c) 5   d) 2

Common Data for Questions 50 and 51
Consider the following circuit involving three D-type flip-flops used in a certain type of counter configuration.

Fig. 49.

50) If at some instance prior to the occurrence of the clock edge, P, Q and R have a value $0, 1$ and 0 respectively, what shall be the value of PQR after the clock edge? **(GATE EE 2025)**

   a) 000   b) 001   c) 010   d) 011

51) If all the flip-flops were reset to 0 at power on, what is the total number of distinct outputs (states) represented by PQR generated by the counter? **(GATE EE 2025)**

   a) 3   b) 4   c) 5   d) 6

Linked Answer Questions
Statement for Linked Answer Questions 52 and 53:
Consider a network with five nodes, N1 to N5, as shown below.
The network uses a Distance Vector Routing protocol. Once the routes have stabilized, the distance vectors at different nodes are as following.
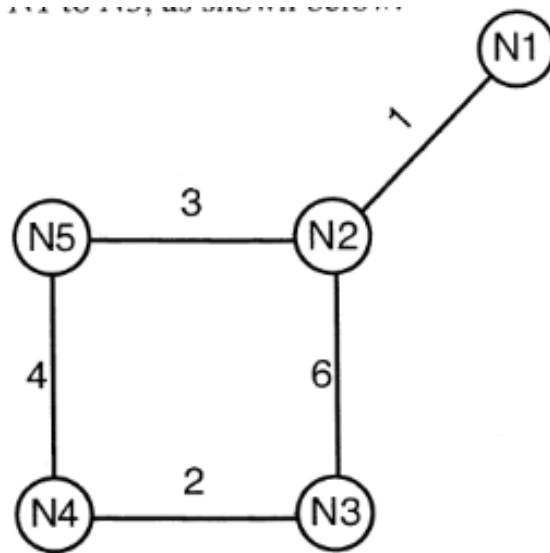

Fig. 51.

$$N1 : (0, 1, 7, 8, 4)$$
$$N2 : (1, 0, 6, 7, 3)$$
$$N3 : (7, 6, 0, 2, 6)$$
$$N4 : (8, 7, 2, 0, 4)$$
$$N5 : (4, 3, 6, 4, 0)$$

Each distance vector is the distance of the best known path at that instance to nodes N1 to N5, where the distance to itself is 0. Also, all links are symmetric and the cost is identical in both directions. In each round, all nodes exchange their distance vectors with their respective neighbors. Then all nodes update their distance vectors. In between two rounds, any change in cost of a link will cause the two incident nodes to change only that entry in their distance vectors.

52) The cost of link $N_2 - N_3$ reduces to 2 (in both directions). After the next round of updates, what will be the new distance vector at node N3? **(GATE EE 2025)**

a) $(3, 2, 0, 2, 5)$　　　b) $(3, 2, 0, 2, 6)$　　　c) $(7, 2, 0, 2, 5)$　　　d) $(7, 2, 0, 2, 6)$

53) After the update in the previous question, the link $N1 - N2$ goes down. N2 will reflect this change immediately in its distance vector as cost ∞. After the **next round of update**, what will be the cost to N1 in the distance vector of N3? **(GATE EE 2025)**

a) 3　　　b) 9　　　c) 10　　　d) ∞

Statement for Linked Answer Questions 54 and 55 An undirected graph G(V, E) contains n $(n > 2)$ nodes named $v_1, v_2, ..., v_n$. Two nodes v_i, v_j are connected if and only if $0 < |i - j| \le 2$. Each edge (v_1, v_2) is assigned a weight $i + j$. A sample graph with $n = 4$ is shown below.

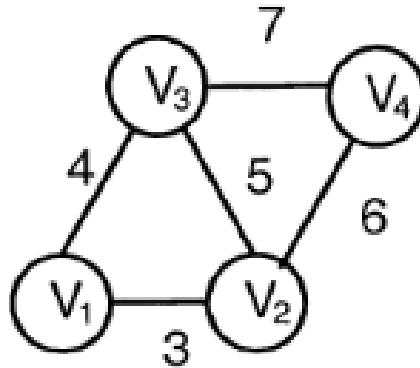Fig. 53.

54) What will the cost of the minimum spanning tree(MST) of such a graph with n nodes? **(GATE EE 2025)**

a) $\frac{1}{12}\left(11n^2 - 5n\right)$　　　b) $n^2 - n + 1$　　　c) $6n - 11$　　　d) $2n + 1$

55) The length of the path from v_5 to v_6 in the MST of the previous question with $n = 10$ is **(GATE EE 2025)**

a) 11　　　b) 25　　　c) 31　　　d) 41

General aptitude (GA) **Questions**
Q56-Q60 carry one mark each

56) Which of the following options is the closest in meaning to the word below:
inexpensible **(GATE EE 2025)**
a) Incomprehensible
b) Indelible
c) Inextricable
d) Infallible

57) If $\log_e(P) = \left(\frac{1}{2}\right)\log_e Q = \left(\frac{1}{3}\right)\log_e(R)$, then which of the following options is **TRUE**? **(GATE EE 2025)**

a) $p^2 = Q^3R^2$　　　b) $Q^2 = PR$　　　c) $Q^2 = R^3P$　　　d) $R = P^2Q^2$

58) Choose the most appropriate words from the options given below to complete the following sentence:
I contemplated _____ for my vacation but decided against it. **(GATE EE 2025)**
a) to visit India

b) visiting to India
c) to visit
d) visit to

59) Choose the most appropriate word from the options given below to complete the following sentence.
   If you are trying to make a strong impression on your audience,you cannot do so by being understand ,tentative or _____ (GATE EE 2025)
   a) hyperbolic
   b) restrained
   c) argumentative
   d) indifferent

60) Choose the word from the options given below that is most nearly opposite in meaning to the given word:
   Amalgamate (GATE EE 2025)
   a) merge
   b) split
   c) collect
   d) separate

   Q60 to Q65 carry 2 marks each

61) **Few school curricula include a unit on how to deal with bereavement and grief, and yet all students at some point in their lives suffer from losses through death and parting.**
   Based on the above passage, which topic would not be included in a unit on bereavement? **(GATE EE 2025)**
   a) how to write a letter of condolence
   b) what emotional stages are passed through in the healing process
   c) what the leading causes of death are
   d) how to give support to a grieving friend

62) P, Q, R and S are four types of dangerous microbes recently found in a human habitat. The area of each circle with its diameter printed in brackets represents the growth of a single microbe surviving the human immunity system within 24 hours of entering the body. The danger to human beings varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure below:
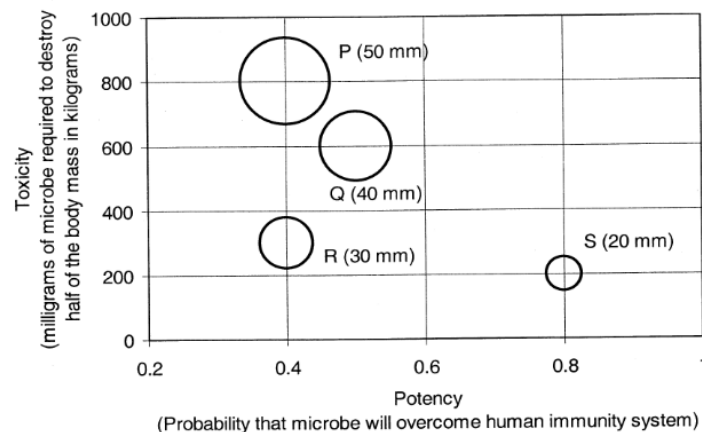

Fig. 62.

A pharmaceutical company is contemplating the development of a vaccine against the most dangerous microbe. Which microbe should the company target in its first attempt? **(GATE EE 2025)**

a) P
b) Q
c) R
d) S

63) The variable cost (V) of manufacturing a product varies according to the equation $V = 4q$, where q is the quantity produced. The fixed cost (F) of production of the same product reduces with q according to the equation $F = \frac{100}{q}$. How many units should be produced to minimize the total cost ($V + F$)? **(GATE EE 2025)**

a) 5   b) 4   c) 7   d) 6

64) A transporter receives the same number of orders each day. Currently, he has some pending orders (backlog) to be shipped. If he uses 7 trucks, then at the end of the 4th day he can clear all the orders. Alternatively, if he uses only 3 trucks, then all the orders are cleared at the end of the 10th day. What is the minimum number of trucks required so that there will be no pending order at the end of the 5th day? **(GATE EE 2025)**

a) 4   b) 5   c) 6   d) 7

65) A container originally contains 10 litres of pure spirit. From this container 1 litre of spirit is replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replaced with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container? **(GATE EE 2025)**

a) 7.58litres   b) 7.84litres   c) 7litres   d) 7.29litres