Mock Test 2

Number of Questions: 65 **Total Marks: 100**

Wrong answer for MCQ will result in negative marks, (–1/3) for 1 Mark Questions and (–2/3) for 2 Marks Question.

General Aptitude

Number of Questions: 10 **Section Marks: 15**

Directions for question 1: Select the word most similar in meaning to the given word:

1. Risque:
(A) Risky (B) Lascivious
(C) Queasy (D) Pompous

***Directions for questions 2 and 3*:** Select the correct alternative from the given choices.

2. In a certain code language, GOOGLE is coded as HNPFMD. How is the word APPLE coded in that language?
(A) BOGKE (B) BQOKF
(C) BOQKF (D) None of these

3. The numbers a, b, c, d and e form a geometric progression. Which of the following also form a geometric progression?
(i) a^2, b^2, c^2, d^2, e^2
(ii) $a-1, b+2, c-3, d+4, e-5$
(iii) $3a, 3b, 3c, 3d, 3e$
(A) Only (i) (B) Only (i) and (ii)
(C) Only (iii) and (i) (D) None of these

***Directions for question 4*:** Select the most suitable one word substitute for the following expression:

4. A place where everything is perfect:
(A) Heaven (B) Cosmos
(C) Synagogue (D) Utopia

***Direction for question 5*:** Select the appropriate word/phrase out of the given options to complete the following sentence:

5. Neither the teacher nor the students _____ any clue as to who could have stolen the keys to the office treasury.
(A) was (B) has
(C) have (D) were

***Directions for question 6*:** Select the correct alternative from the given choices.

6. Consider a function $f(x) = 3 - |x|$, where $-2 \le x \le 2$. The minimum and maximum values of $f(x)$ are:
(A) 0, 2 (B) 0, –2
(C) 1, 3 (D) 0, –4

***Directions for question 7*:** In the following sentence certain parts are underlined and marked *P*, *Q*, and *R*. One of the parts may contain a certain error or may not be acceptable in standard written communication. Select the part containing the error. Choose D as your answer if there is no error.

7. <u>There are no machineries</u> for resolving
(P)
<u>these disputes and this has,</u> in no small
(Q)
measure, compounded <u>the present situation.</u>
(R)
(A) P (B) Q
(C) R (D) No error

***Directions for question 8*:** Which one of the statements given below the passage is logically valid and can be inferred from the passage below?

8. Napoleon Bonaparte was one of the world's youngest generals. At the age of 24 he was master of the art of war, a military general and a cruel dictator at heart. He had the magnetism of the great and he won devoted friendship from many. His glance, like Akbar's, was magnetic. He often said that he had won many battles with his eyes, not the sword. A strange statement for a man who had plunged Europe into war. And it appears, during his last years when he was imprisoned at St. Helena, he had a change of heart. Good thoughts came to him during the fading years of life, his painful period of exile. He was much chastened, and perhaps wrote to influence posterity in his favour. He wrote that the conquest of the spirit is greater than the conquest of the sword.
(A) Napoleon Bonaparte was not the world's youngest general.
(B) Napoleon Bonaparte was not the world's youngest dictator.
(C) Napoleon Bonaparte believed that some day victories would be won without cannons and bayonets.
(D) Napoleon Bonaparte was thoroughly irreligious but he encouraged religion.

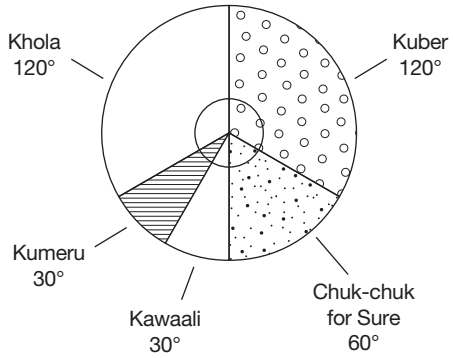
***Directions for questions 9 and 10*:** Select the correct alternative from the given choices.

9. The chairman of a multinational corporation desires to appoint four of the five selected persons *A*, *B*, *C*, *D* and *E* to lead the four different domains of the organization, which are Operations, Marketing, Finance and R&D. *C* doesn't want to get hitched to one specific domain as he desires to have an exposure to all the four domains.

B is given the designation of Operations head. Neither *D* nor *A* is posted as Marketing heads.
Which of the following can be a valid assignment of heads to the domains?
(A) *A*–Marketing, *B*–Operations, *C*–Finance, *D*–R&D
(B) *A*–Finance, *B*–Operations, *D*–R&D, *E*–Marketing
(C) *A*–Operations, *B*–Finance, *C*–R&D, *D*–Marketing
(D) None of these

10. The pie chart below gives the breakup of market share by volume of five different fleet management companies in the year 2015. The proportion of male to female customers of each company is 5 : 1. If the total number of customers of the five companies in 2015 is 216000.

The Number of customers of Chuk-chuk for Sure are females is _____.



Computer Science Engineering

Number of Questions: 55 **Section Marks: 85**

Directions for questions 11 to 65: Select the correct alternative from the given choices.

11. The third term in the Taylor's series expansion of the function $f(x) = 5x^2 + \cos x$ about $x = \pi$ is _____.

(A) 0 (B) $\frac{9}{2}(x-\pi)^2$

(C) $\frac{11}{2}(x-\pi)^2$ (D) $\frac{13}{6}(x-\pi)^3$

12. If *A* and *B* are two square matrices of same order such that $AB = A$, $BA = B$, then:
(A) both *A* and *B* are idempotent
(B) both *A* and *B* are involutory
(C) *A* is idempotent and *B* is involutory
(D) *A* is involutory and *B* is idempotent

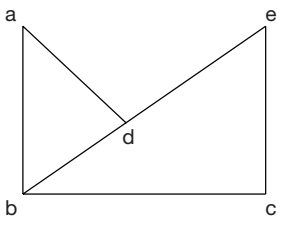
13. If *X* is a continuous random variable with probability density function $f(x)$ given by:

$$f(x) = \begin{cases} ax(1-x); & 0 \le x \le 1 \\ 0; & \text{otherwise} \end{cases}$$

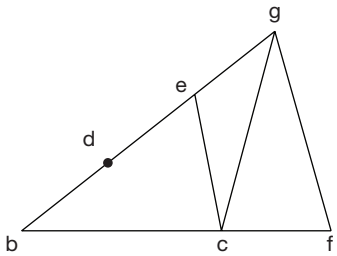
Then the mean of *X* is _____.

14. The maximum possible number of reflexive relations that can be defined on a set $S = \{k, l, m, n\}$ is _____.

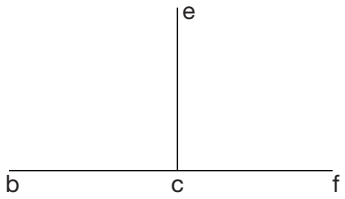
15. Consider an undirected graph G given below.
Which of the following is NOT an induced subgraph of the graph G?

(A)


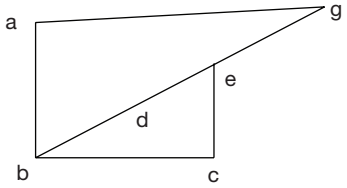
G_1

(B)


G_2

(C)


G_3

(D)


G_4

16. The minimum number of comparisons required to find the maximum element in a min-heap of *n* elements is:

(A) $\log_2 n$ (B) $\frac{n}{2}$

(C) $\left\lfloor \frac{n}{2} \right\rfloor - 1$ (D) $\left\lceil \frac{n}{2} \right\rceil - 1$

17. Five nodes labeled *P*, *Q*, *R*, *S*, *T* are used to construct a binary tree. The number of distinct binary trees that can be formed such that each of those in-order traversal gives *P Q R S T* is _____.

18. Which of the following mechanisms will interrupt the execution of a process?
(P) Interrupt (Q) Trap
(R) Supervisor call (S) Memory fault
(A) P, R (B) P, Q, R
(C) P, R, S (D) P, Q, R, S

19. Which of the following is affected from external fragmentation?
(A) Simple paging
(B) Virtual memory segmentation
(C) Virtual memory paging
(D) None of the above

20. Consider the following:
$E \rightarrow TE^I$
$E^I \rightarrow +TE^I | \in$
$T \rightarrow FT^I$
$T^I \rightarrow *FT^I | \in$
$F \rightarrow (E) |$ id
The follow set of F does not contain
(A) {id, (} (B) {+, $}
(C) {$, *} (D) {*,)}

21. Which of the following statement is TRUE?
(A) Preprocessing is required for every programming language before compiling a program.
(B) Symbolic names can be associated with the mnemonic instruction.
(C) Symbol table can be implemented using hash table.
(D) All of the above

22. Consider an AVL Tree with 'n' elements stored in an array [with array index starting from 1]. Now a Binary search is performed on some elements in AVL tree that is on the elements positioned on $(2^i – 1)$ places. Time complexity for searching an element on the above scenario will be:
(A) $O(\log (\log n))$
(B) $O(\log n)$
(C) $O(n)$
(D) Binary search cannot be implemented for above scenario.

23. Consider a Recurrence equation,
$T(n) = 3T(n – 1) + O(n^2)$
Then the time complexity for $T(n)$ is:
(A) $O(n^2)$ $B)$ $O(n^3)$
(C) $O(3^n \cdot n^3)$ (D) $O(3^n \cdot n^2)$

24. Consider a relation $R(X, Y, Z, P, Q)$ with functional dependencies:
$XYZ \rightarrow PQ$
$Q \rightarrow YZP$
The number of candidate key(s) for the relation R is _____.

25. Consider a relation,
Student (Roll-No, Name, mark1, mark2)
Which of the following query is valid on this relation?
(A) select SUM(Name) from Student
(B) select Average(mark1, mark2) from Student
(C) select Roll-No, Max (marks) from Student
(D) select SUM(mark1) from Student

26. Match the following:

Group–A		Group–B	
A	Binary search	1.	Divide and conquer
B	Traveling sales person problem	2.	Greedy approach
C	Merge sort	3.	Dynamic programming
D	Job sequencing problem	4.	Back tracking

(A) A–1, B–3, C–1, D–2
(B) A–4, B–2, C–4, D–4
(C) A–4, B–3, C–1, D–4
(D) A–1, B–2, C–1, D–2

27. Which of the following task is not related to Instruction cycle?
(i) Instruction fetch
(ii) Zero or more operand fetch
(iii) Zero or more operand stores
(iv) An interrupt check if interrupts are enabled
(A) (ii), (iii)
(B) (ii), (iv)
(C) (iv) only
(D) All the tasks are related to instruction cycle

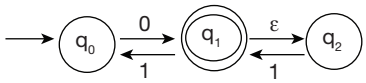
28. A program which has 10000 instructions, run on a 20 MHz processor, with the following instruction mix and clock cycle count.

Instruction type	Instruction count	Clock cycles
I_1	4500	1
I_2	3200	2
I_3	1500	2
I_4	800	2

What will be the values of CPI and MIPS respectively?
(A) 2 and 0.0775 (B) 1.55 and 12.9
(C) 1.75 and 12.9 (D) 1.55 and 0.0775

29. Which of the following operations is/are not internal processor operations of instruction cycle?
(i) Instruction fetch
(ii) Instruction address calculation
(iii) Instruction operation Decoding
(iv) Operand fetch
(v) Data operation
(vi) Operand address calculation
(vii) Operand store
(A) (i), (ii), (iii)
(B) (iv), (v), (vi), (vii)
(C) (i), (iv), (vii)
(D) (ii), (vi)

30. Consider the following ε-NFA:



If the ε-Transition needs to be removed, then how many new transitions will be added and what are they?

(A) $2, q_1 \xrightarrow{1} q_2, q_1 \xrightarrow{1} q_1$
(B) $1, q_1 \xrightarrow{1} q_2$
(C) $2, q_1 \xrightarrow{1} q_1, q_0 \xrightarrow{0} q_2$
(D) $1, q_0 \xrightarrow{0} q_2$

31. Which of the following statement is FALSE?

(A) Amongst the three languages Regular, context-free and recursive, Regular language is most specific.
(B) If P is recursively enumerable but not recursive then $\overline{P}$ is non-recursively enumerable.
(C) If C is a context free language then $\overline{C}$ is recursive.
(D) If R is a regular expression and T is a turning machine for the language then T may or may not halt on R.

32. Which of the following is FALSE about OSI layered model?

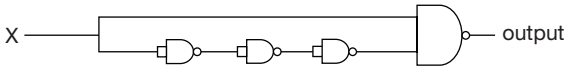
(i) Physical, Data link, Network and Transport layers are Host layers.
(ii) The layered architecture provides the modularity.
(iii) Transport layer is responsible for the communication between two applications running on different computers.

(A) (i), (ii) Only (B) (iii) only
(C) (i) only (D) (i), (iii) only

33. Consider below sequence of bits, arrived on a link:
0111 1110 1000 0111 1101 1001 1010 1000 0111 1101 1100 1111 1111 0111 1110.
If HDLC framing is used for the protocol then which of the following is not justified with the given frame format?

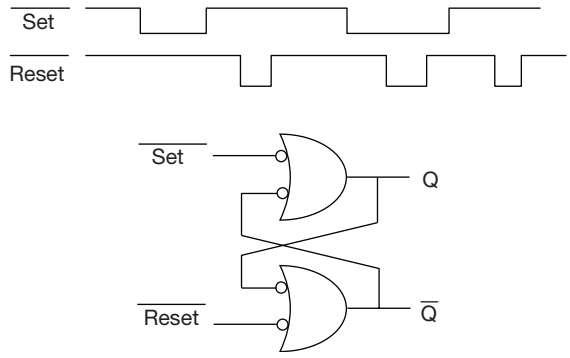
(A) The frame start and end bits are 0111 1110
(B) There are two stuffed bits in the frame
(C) There are 2 error bits in given frame
(D) The address field has 1000 0111

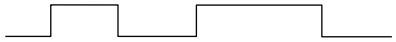
34. Consider the logic circuit with input signal X as shown in the figure. All the gates in the figure shown have identical non-zero delay. The signal X which was at logic LOW is switched to logic HIGH and maintained at logic HIGH. Then the output



(A) Stays high throughout
(B) Stays low throughout
(C) pulses from LOW to HIGH to LOW
(D) pulses from HIGH to LOW to HIGH

35. The wave forms $\overline{\text{Set}}$, $\overline{\text{Reset}}$ are applied to the inputs of the following latch, then the wave form of Q will look like? (Consider initial state as 0)



(A) 
(B) 
(C) 
(D) 

36. If 1, 4 and 5 are the eigen values of 3×3 matrix A, then the matrix $A^2 - 5A + 6I_3$ has _____.

(A) three distinct eigenvalues
(B) two distinct eigenvalues
(C) all the three eigenvalues are equal
(D) an eigenvalue zero.

37. If p, q and r are any three statement variables, then which of the following is NOT a tautology?

(A) $(p \wedge q) \rightarrow [(p \vee q) \vee (\neg p \wedge \neg q)]$
(B) $[p \wedge (q \vee r)] \vee [\neg p \vee (\neg q \wedge \neg r)]$
(C) $[(p \vee q) \rightarrow r] \leftrightarrow [\neg r \rightarrow \wedge (p \vee q)]$
(D) $[p \rightarrow (q \rightarrow r)] \wedge [\neg p \vee q \vee r]$

38. If a fair die is rolled thrice, then the expected value of the product of the numbers that appear on the die in the three rolls is _____.

(A) $\frac{7}{2}$ (B) $\frac{21}{2}$
(C) $\frac{343}{8}$ (D) $\frac{1}{2}$

39. The maximum value of the function $f(x) = (x-1)^2 e^{-x}$ is _____.

40. Consider the 2×2 matrices $A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and let $G = \{A, B, C, I\}$. Then the generators of the cyclic group G under matrix multiplication are _____.

(A) A and B (B) B and C
(C) C and I (D) I and A

41. Consider the below truth table:

X	Y	Z	F(X, Y, Z)
0	0	0	1
0	0	1	D
0	1	0	0
0	1	1	0
1	0	0	D
1	0	1	0
1	1	0	1
1	1	1	1

How many number of 2 input NOR gates are required to implement the function $F(X, Y, Z)$ (D-Stands for don't care condition)?

(A) 3 (B) 4
(C) 5 (D) 6

42. Consider a network topology with two nodes $N1$ and $N2$. $N1$ sends a file of 10 MB to $N2$ using sliding window protocol. The Data is sent using a frame of size 1 KB and the size of acknowledgement is 40 Bytes. The propagation delay is 100 ms. The link has a speed of 10 Mbps. $N1$'s sending window size is five frames and receiving window size is 10000 frames. Then the throughput of $N1$ (in KBPS) is _____.

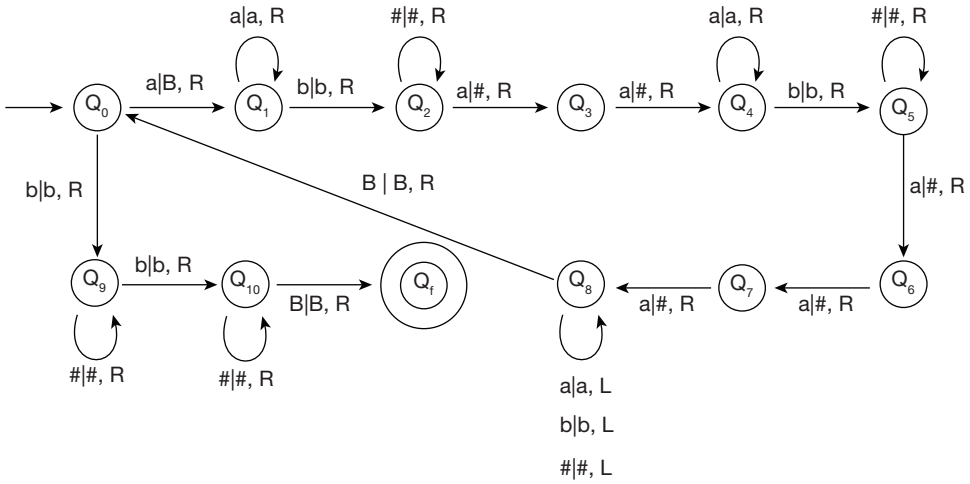
43. Consider a TCP socket connection between application processes $P1$ and $P2$ running on two different hosts. If $P1$ wants to send 10000 Bytes of data to $P2$ and the operating system started sending data from $P1$ to $P2$. Then which of the following is TRUE?

(i) If $P1$ calls close() on the socket before the OS finishes transmitting the data to $P2$ then also the OS continues the transmission of data to $P2$.
(ii) If $P1$ calls close() after the OS has transmitted all the data to $P2$ then OS sends TCP FIN packet to $P1$.
(iii) The process $P2$ can perform multiple receive() calls to receive the entire data from $P1$.
(iv) If $P1$'s connection is closed and $P2$ read all the data from $P1$ then next call of $P2$'s receive() returns an end of stream.

(A) (i), (iii) (B) (ii), (iii)
(C) (ii), (iii), (iv) (D) (i), (ii), (iii), (iv)

44. To transmit the message,
$x^{15} + x^{14} + x^{12} + x^{11} + x^8 + x^6 + x^4 + x^3 + 1$
Using the CRC generator $x^8 + x^6 + x^3 + 1$, the check sequence that will be added to the message to protect it from errors using CRC (in Binary) is _____.

45. Consider below Turing machine:



Each transition $X|Y$, D specifies the input symbol X, symbol to be written Y and Direction of head movement D. Here $\Sigma = \{a, b\}$ and tape symbols are $\{a, b, \#, B\}$. What is the language accepted by given Turing machine?

(A) $\{a^n\ b\ a^{n/2}\ b\ a^{n/3} \mid n \geq 0\}$
(B) Set of all strings over Σ such that (number of a's) % 6 = 0
(C) $\{a^n\ b\ a^{2n}\ b\ a^{3n} \mid n \geq 0\}$
(D) $\{a^n\ b\ a^{2n}\ b\ a^{3n} \mid n$ is an even number$\}$

46. Which of the following language is Regular?

(i) $\{w \mid w \in \{0, 1\}^*$ and w has prime number of 1's$\}$
(ii) $\{w \mid w \in \{0, 1\}^*$ and every odd position of w is 1$\}$
(iii) $\{w \mid w$ describes a valid Sudoku puzzle$\}$. Here $\Sigma = \{1, 2, 3, 4, 5, 6, 7, 8, 9,$ Blank$\}$.
(iv) $\{w \in \Sigma^* \mid n_a(w) \bmod 4 = 1\}$.

Here $\Sigma = \{a, b\}$, and $n_a(w)$ is number of a's in the string 'w'.

(A) (i), (ii), (iii), (iv) (B) (ii), (iii), (iv)
(C) (ii), (iv) only (D) (i) only

47. Consider a standard pipeline with 5-Stages: Fetch (F), Decode (D), Execute (X),
Memory (M), Write back (W)
This 5-Stage pipeline is converted into a 4-stage pipeline by combining two stages.

Match list-A with list-B by identifying which improvement is obtained by combining which stages of the pipeline:

List-A		List-B	
1.	Combining D and X stages	P	Reduction in branch miss prediction penalty
2.	Combining X and M stages	Q	Reduction in Bypassing path
3.	Combining M and W stages	R	Elimination of load-to-use stall cycle
4.	Combining F and D stages	S	No need of branch target Buffer

(A) 1–P, 2–Q, 3–R, 4–S
(B) 1–S, 2–Q, 3–R, 4–P
(C) 1–P, 2–R, 3–Q, 4–S
(D) 1–S, 2–R, 3–Q, 4–P

48. During the design of a cache memory there are two kinds of choices available:
(i) A direct mapped cache with a hit latency of 3 clock cycles.
(ii) A set-associative cache with a hit latency of 4 clock cycles
In either case the miss penalty is 10 cycles.
If the set-associative cache is selected and it needs to provide lower average latency than direct mapped cache with 15% miss rate, then the miss rate of set-associative cache must be (less than in percentage) _____.

49. Consider a pipelined processor $P1$ with a cycle time of 10 ns. A Benchmark program executed on this processor, exhibited an average CPI of 1.2, the program has 10% branch instructions and branch prediction scheme accuracy is 90%. Every branch mis prediction costs 3 cycles delay on $P1$.
Now a new pipelined processor $P2$ is designed with cycle time of 9 ns and an increase in pipeline depth compared to $P1$. On $P2$, the penalty for branch misprediction is 5 cycles. If the benchmark program executed on $P2$, then the average CPI of $P2$ is _____.

50. Consider the following statements:
S_1: A Relation with 2 attributes does not have partial dependency and transitive dependency.
S_2: Query Retrieval performance will get reduced, if a relation is undergone with more number of normalizations.
S_3: BCNF mainly focuses on the primary key.
Which of the above statements is/are TRUE?
(A) Only S_1 (B) S_1 and S_2
(C) S_2 and S_3 (D) S_1, S_2, S_3

51. Construct a B-Tree of order 3 with the key values as given:
5, 10, 15, 20, 25, 30, 35, 40, 45, 50
The number of nodes at the last level is _____.

52. Consider a serial schedule (S)

T_1	T_2
Read (X)	
$X = X * 10$	
Write (X)	
Read (Y)	
$Y = Y + 100$	
Write (Y)	
	Read (X)
	$X = X - 1000$
	Write (X)
	Read (Y)
	$Y = Y * 20$
	Write (Y)

Consider the non-serial schedules S_1, S_2, S_3 for the above schedule 'S'.
$S1$:

T_1	T_2
Read (X)	
$X = X * 10$	
Write (X)	
	Read (X)
	$X = X - 1000$
	Write (X)
Read (Y)	
$Y = Y + 100$	
Write (Y)	
	Read (Y)
	$Y = Y * 20$
	Write (Y)

$S2$:

T_1	T_2
Read (X)	
$X = X * 10$	
	Read (X)
	$X = X - 1000$
Write (X)	
	Write (X)
Read (Y)	
$Y = Y * 20$	
	Read (Y)
	$Y = Y * 20$
Write (Y)	
	Write (Y)

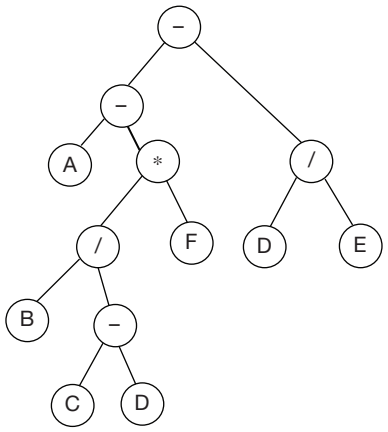
*S*3:

T_1	T_2
Read (*X*)	
$X = X * 10$	
Write (*X*)	
	Read (*X*)
	$X = X - 1000$
	Write (*X*)
Read (*Y*)	
$Y = Y + 100$	
	Read (*Y*)
	$Y = Y * 20$
Write (*Y*)	
	Write (*Y*)

Which of the above schedules (S_1, S_2, S_3) are view equivalent to serial schedule '*S*'?

(A) Only S_1 (B) S_1 and S_2
(C) S_2 and S_3 (D) S_1, S_2, S_3

53. Consider the given expression tree:



Which of the following are correct Infix and Postfix expressions?

(A) $A - B/(C - D)*F - D/E$ and $ABCD/- F *- DE/-$
(B) $A/B - (C - D)*F - D/E$ and $ABCD -/F*- DE/-$
(C) $A - B/(C - D)*F - D/E$ and $ABCD -/F*- DE/-$
(D) $A - B/(C - D)*F/D - E$ and $ABCD -/F*- DE/-$

54. Consider an array containing 8 elements {36, 97, 44, 12, 58, 49, 11, 84}.
Implement three sorting algorithms on the above array: Bubble sort, Insertion sort, Selection sort.
Match the sorting algorithm with the intermediate result of an array after four passes or Iterations

Sorting algorithm	Intermediate result after 4-passes
(A) Bubble sort	(I) [11, 12, 36, 44, 49, 97, 58, 84]
(B) Selection sort	(II) [12, 36, 44, 97, 58, 49, 11, 84]
(C) Insertion sort	(III) [12, 36, 11, 44, 49, 58, 84, 97]
	(IV) [36, 11, 44, 12, 49, 58, 84, 97]
	(V) [11, 12, 36, 44, 58, 49, 97, 84]
	(VI) [12, 36, 44, 58, 97, 49, 11, 84]

(A) A–(I), B–(IV), C–(VI)
(B) A–(III), B–(IV), C–(VI)
(C) A–(I), B–(VI), C–(II)
(D) A–(III), B–(V), C–(II)

55. Number of labeled spanning trees of the complete bipartite graph $k_{3,3}$ is _____.

56. Consider the grammar:

$S \rightarrow abX$ {Print (0)}
$S \rightarrow c$ {Print (1)}
$X \rightarrow dS$ {Print (2)}

For this SDT construct, if the input string is "*a b d a b d c*", then the output is:

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

57. Consider the following grammar:

(P) $E \rightarrow T + E | T$
$T \rightarrow id$
(Q) $A \rightarrow (A) | a$
(R) $S \rightarrow Aba \mid Bb$
$A \rightarrow bAa \mid d$
$B \rightarrow d$

Which of the above grammar has both Shift-reduce and Reduce-Reduce Conflicts using LR(0) parsing algorithm?

(A) Only P (B) Only Q
(C) Only R (D) Both P, R

58. Match the following:

Group-A		Group-B	
P	Deadlock avoidance	1.	Cycle in the wait-for graph
Q	Deadlock prevention	2.	Safe state algorithm
R	Deadlock detection	3.	Allocate all the required resources before the start of process execution
S	Deadlock recovery	4.	Resource preemption
		5.	Bankers algorithm
		6.	Resource request algorithm

(A) P–2, Q–4, R–5, S–6
(B) P–5, Q–3, R–1, S–4
(C) P–5, Q–4, R–6, S–3
(D) P–2, Q–3, R–2, S–6

59. Which of the following statements is FALSE?

(A) Degree of multiprogramming in a system is independent of scheduling algorithm.
(B) Virtual memory size depends on the size of the address bus.
(C) Dynamic partition memory technique is affected with Internal fragmentation
(D) None of the above

60. A process has been allocated 4 page frames. Initially the page frames are empty. The process makes the following sequence of page references 1, 2, 3, 2, 1, 4, 6, 3, 4, 7, 3, 1, 2.
If optimal page replacement policy is used, then the number of page faults is _____.

61. Consider below table:

P–ID	Arrival time	Burst time	Priority
P_1	4	3	3
P_2	7	5	4(high)
P_3	1	6	1
P_4	2	5	2

If the processes are executed, using the scheduling algorithms–Round Robin with time slice 2 units (RR), preemptive shortest job first (P-SJF) Preemptive Priority scheduling (PP), then which of the following order specifies the correct order based on average response time (Ascending order)?
(A) RR, PP, P-SJF (B) P-SJF, RR, PP
(C) PP, RR, P-SJF (D) PR, P-SJF, PP

62. Consider the routine fun( ):

```
void fun(int x)
{
if (x > 0)
{
fun(x - 1);
printf("%d", x);
fun(x - 1);
}
}
```

When fun(4) is called, the number of function calls would be _____.

63. Suppose we have numbers between 1 and 1000 in a binary search tree and want to search for the number 364. Which of the following sequence could not be the sequence of nodes examined?
(A) 3, 253, 402, 399, 331, 345, 398, 364,
(B) 926, 203, 912, 241, 913, 246, 364
(C) 3, 400, 388, 220, 267, 383, 382, 380, 279, 364
(D) 936, 279, 346, 620, 347, 391, 359, 364

64. Consider a single linked list with '*n*' elements:

```
struct Node
{
struct Node *next;
int data;
} list;
Consider a routine fun():
struct Node *fun(list *head, int K)
{
struct node *P1, *P2;
P1 = P2 = head;
while ( I )
{
P2 = P2 → next;
if ( II )
return NULL;
K - -;
}
while ( III )
{
P1 = P1 → next;
P2 = P2 → next;
}
return P1;
}
```

Fill in the blanks, if fun ( ) gives the K^{th} node from the end of the list.

	I	II	III		I	II	III
(A)	P_1	P_2	K	(B)	$!P_2$	P_1	K
(C)	K	$!P_1$	P_2	(D)	$!P_2$	$P1$	K

65. A TCP machine is sending full windows of 65,535 bytes over a 1 Gbps channel that has 20 m sec one-way delay. What is the maximum throughput achievable?
(A) 1262645 bytes
(B) 1462625 bytes
(C) 1638375 bytes
(D) 1842625 bytes

Answer Keys

1. B	**2.** C	**3.** C	**4.** D	**5.** C	**6.** C	**7.** A	**8.** A	**9.** B	**10.** 6000
11. C	**12.** A	**13.** 0.5	**14.** 4,096	**15.** D	**16.** D	**17.** 42	**18.** D	**19.** B	**20.** A
21. C	**22.** A	**23.** D	**24.** 1	**25.** D	**26.** A	**27.** D	**28.** B	**29.** C	**30.** C
31. D	**32.** C	**33.** C	**34.** D	**35.** B	**36.** B	**37.** D	**38.** C	**39.** 0.18 to 0.20	
40. B	**41.** B	**42.** 25	**43.** D	**44.** 11010000		**45.** C	**46.** B	**47.** C	**48.** 5
49. 1.22	**50.** B	**51.** 5	**52.** A	**53.** C	**54.** D	**55.** 81	**56.** A	**57.** C	**58.** B
59. C	**60.** 7	**61.** C	**62.** 31	**63.** B	**64.** C	**65.** C			

Hints and Explanations

1. The synonym of risque is lascivious or vulgar. Queasy means sickening and pompous means overdone or affected and have little to do with the headword.
Choice (B)

2.

G	*O*	*O*	*G*	*L*	*E*
+1	–1	+1	–1	+1	–1
H	*N*	*P*	*F*	*M*	*D*

Similarly,

A	*P*	*P*	*L*	*E*
+1	–1	+1	–1	+1
B	*O*	*Q*	*K*	*F*

Choice (C)

3. The numbers a, b, c, d, e are in geometric progression.

$\therefore \quad \frac{b}{a} = \frac{c}{b} = \frac{d}{c} = \frac{e}{d}$ let each of these be k.

(i) $\frac{b^2}{a^2} = \frac{c^2}{b^2} = \frac{d^2}{c^2} = \frac{e^2}{d^2} = k^2$

$\therefore \quad a^2, b^2, c^2, d^2, e^2$ are in geometric progression.

(ii) The given terms need not be in geometric progression.

(iii) $\frac{3b}{3a} = \frac{3c}{3b} = \frac{3d}{3c} = \frac{3e}{3d} = k$

$3a, 3b, 3c, 3d, 3e$ are in geometric progression.

Only (i) and (iii) are in geometric progression.
Choice (C)

4. Utopia is a place where everything is perfect. Synagogue is a place of worship for Jews. Choice (D)

5. The pair conjunction "neither ... nor" always takes a plural verb with the plural subject being placed second. So "have" is apt. Choice (C)

6. $f(x) = 3 - |x|$ where $-2 \le x \le 2$,
$|a| = a$ when $a \ge 0$,
$= -a$ when $a < 0$,
$|x|$ ranges from 0 to 2.
$f(x)$ has the minimum and the maximum values when x has the maximum and the minimum values respectively.
Min $(f(x)) = 3 - 2 = 1$.
Max $(f(x)) = 3 - 0 = 3$. Choice (C)

7. The noun "machinery" is correct and it cannot be used in the plural with an "*s*". So the entire structure accompanying it has to be in the singular. Thus, "there is no machinery for ..." is apt. Choice (A)

8. Statement (B) is not true. The passage only states that he was a dictator "at heart", not a crowned and dreaded despotic ruler. Towards the end of the passage we are told of his beliefs regarding war. He came to believe that the conquest of the self was the greatest conquest. This DOES NOT mean he believed that men would shun violence and live peacefully. So (C) too is ruled out. (D) is ruled out as it is out of the text. Choice (A) is correct as per the first line of the passage. "... one of the ..." means not the only. Choice (A)

9.

Person	Designation
A	Head of R&D/Finance
B	Head of operations
C	Posted to work in all departments
D	Head of Finance/R&D
E	Head of Marketing

A valid assignment of heads to the domains can be.
A–Finance
B–Operations
D–R&D E–Marketing. Choice (B)

10. Total number of people using "Chuk–chuk for sure"
$= \frac{60}{360}(216000) = 36000$
Number of female customers of this company
$= \frac{1}{6}(36000) = 6000$ Ans: 6000

11. Given $f(x) = 5x^2 + \cos x$
The Taylor's series expansion of $f(x)$ about $x = a$ is:

$$f(x) = f(a) + 9x - a)f^1(a) + \frac{(x-a)^2}{2!}f^{11}(a) + ...\infty$$

$\therefore$ The third term is $\frac{(x-a)^2}{2!}f^{11}(a)$

Here $f(x) = 5x^2 + \cos x$ and $x = \pi$
$\Rightarrow \quad f^{11}(x) = 10 - \cos x$
$\therefore \quad f^{11}(a) = f^{11}(\pi) = 10 - \cos \pi = 11$
$\therefore$ The third term in the Taylor's series expansion of $f(x)$ about $x = \pi$ is $\frac{(x-\pi)^2}{2!} \times 11 = \frac{11}{2}(x-\pi)^2$

Choice (C)

12. Given, $AB = A \rightarrow (1)$
and $BA = B \rightarrow (2)$
From (1) $AB = A$
$\Rightarrow \quad (AB)A = A \times A$
$\Rightarrow \quad A(BA) = A^2$
$\Rightarrow \quad A(B) = A^2$ (from (2))
$\Rightarrow \quad A = A^2$ (from (1))
$\Rightarrow \quad A^2 = A \Rightarrow A$ is an idempotent matrix.
From (2), $BA = B$
$(BA)\ B = B \times B$
$\Rightarrow \quad B(AB) = B^2$
$\Rightarrow \quad B(A) = B^2$ (from (1))
$\Rightarrow \quad B = B^2$ (from (2))
$\Rightarrow \quad B^2 = B$
$\Rightarrow \quad B$ is an idempotent matrix. Choice (A)

13. Given the p.d.f of X is

$$f(x) = \begin{cases} ax(1-x) & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

As $f(x)$ is a p.d.f of X, we have

$$\int_{-\infty}^{\infty} f(x)\,dx = 1 \Rightarrow \int_0^1 a(x - x^2)\,dx = 1$$

$$\Rightarrow \quad a\left[\frac{x^2}{2} - \frac{x^3}{3}\right]_0^1 = 1$$

$$\Rightarrow \quad a\left[\frac{1}{2} - \frac{1}{3}\right] = 1 \Rightarrow a\left(\frac{1}{6}\right) = 1$$

$$\Rightarrow \quad a = 6$$

$$\therefore \quad f(x) = \begin{cases} 6x(1-x) & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

The mean of X is

$$E(X) = \int_{-\infty}^{\infty} xf(x)\,dx = \int_0^1 x(6x(1-x))\,dx$$

$$= 6\int_0^1 (x^2 - x^3)\,dx$$

$$= 6\left[\frac{x^3}{3} - \frac{x^4}{4}\right]_0^1 = 6\left[\frac{1}{3} - \frac{1}{4}\right] = \frac{6}{12}$$

$$\therefore \quad E(X) = \frac{1}{2} \qquad \text{Ans: 0.5}$$

14. Given $S = \{k, l, m, n\}$

The number of ordered pairs in $S \times S = 16$

Of these 16 ordered pairs, the ordered pairs (k, k) (l, l) (m, m) and (n, n) must be present in every reflexive relation on S.

So, any reflexive relation on S contains these 4 ordered pairs along with any of the remaining 12 ordered pairs of $S \times S$.

$\therefore$ The maximum possible number of reflexive relations that can be defined on S

= The number of subsets of a set with 12 elements.

$= 2^{12} = 4{,}096$ Ans: 4,096

15. An induced subgraph H of a graph G is a subgraph of G that consists of all those edges of G which are present between every pair of vertices that are present in H.

Among the options given, graph G_4 is not an induced sub graph of G because in G there is an edge between the vertices a and d as well as an edge between c and g but those edges are not in G_4. Choice (D)

16. The maximum element in a min-heap will be resided in the leafs. The number of leaf's in heap of n-elements are $\left\lceil \frac{n}{2} \right\rceil$. So total number of comparisons required are $\left\lceil \frac{n}{2} \right\rceil - 1$. Choice (D)

17. The number of binary tree structures that can be formed with 'n' lables are $\left(\frac{^{2n}C_n}{n+1}\right)$ i.e., with 5 elements we can form $\left(\frac{^{10}C_5}{6}\right) = 42$ trees.

In these structures we can place the data elements, to get the in order traversal of the above order – PQRST.

Ans: 42

18. Choice (D)

19. Choice (B)

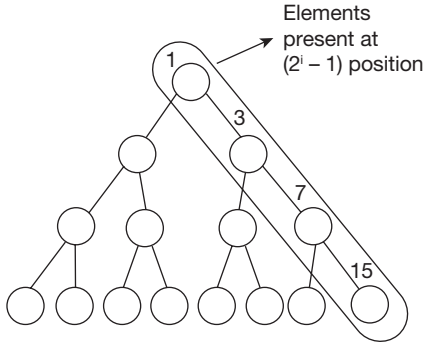
20. Follow (F) = {*, +, $,)} Choice (A)

21. Preprocessing is optional. Symbolic names are associated with data or information.

Symbol table can be implemented using linear table, ordered list, tree and Hash table. Choice (C)

22. AVL Tree is a balanced binary search tree. The elements positioned at $(2^i - 1)$ places is nothing but right skewed tree elements [elements which are right child from root node onwards].

i.e., consider an example



Number of nodes in an AVL-Tree of 'n' nodes has (log n) elements for above scenario.

To search an element in (log n) elements using binary search, it takes $O(\log(\log n))$ time. Choice (A)

23. If a recurrence equation,

$T(n) = aT(n-b) + O(n^k)$, with $a > 0$, $b \ge 1$, $k \ge 0$.

The time complexity of $T(n)$ with $a > 1$, takes $O(n^k \cdot a^{n/2})$time.

So for the recurrence equation,

$T(n) = 3T(n-1) + O(n^2)$ takes

$O(n^2 \cdot 3^{n/2}) \gg O(3^n \cdot n^2)$. Choice (D)

24. The key is (XQ) Ans: 1

25. **Option (A):** Not valid

The Aggregate function SUM will work only on the numeric columns.

Option (B): Not valid

The Aggregate function will work on only single column and produce single column output.

Option (C) Not valid
If non-aggregate column associated with the aggregate column then that query must be associated with GROUP BY clause. Choice (D)

26. Choice (A)

27. An instruction cycle consists of instruction fetch, followed by 0 or more operand fetch, followed by 0 or more operand stores followed by an interrupt check. Choice (D)

28. $$\text{CPI} = \frac{4500\times1 + 3200\times2 + 1500\times2 + 800\times2}{10000}$$

$$= \frac{4500 + 6400 + 3000 + 1600}{10000} = \frac{15500}{10000} = 1.55$$

$$\text{MIPS} = \frac{\text{Clock rate}}{\text{CPI}\times10^6} = \frac{20\times10^6}{1.55\times10^6} = 12.9$$ Choice (B)

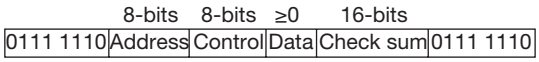
29. Instruction fetch, operand fetch, operand store requires some exchange between processor and either memory or I/O module. Remaining are done inside the processor. Choice (C)

30. To remove ε-Transition we have to add new transitions; we can reach q_2 from q_1 with 'ε' and from q_2 to q_1 with 1. i.e., q_1 will reach itself with input 1.
Similarly, q_0 can reach q_2 with input '0'. So a transition from q_0 to q_2 will be added. Choice (C)

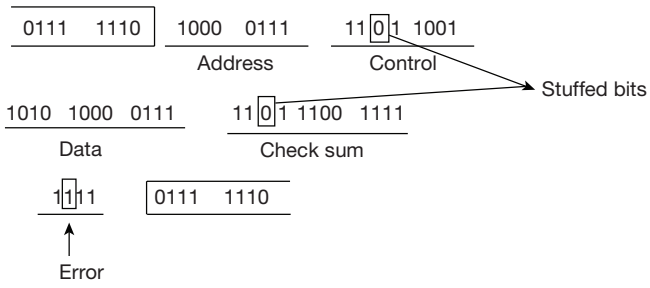
31. T must halt with Regular expression R. Choice (D)

32. The Host layers in OSI model are Transport, Session, Presentation and Application Layers. Choice (C)

33. The HDLC frame format is:

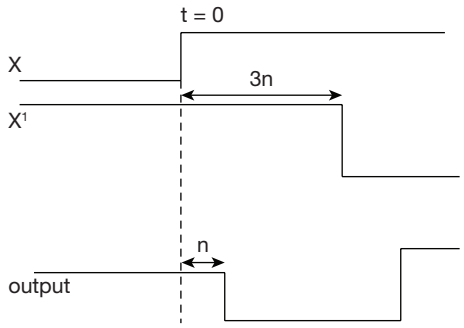


The start and end of the frame are 0111 1110.
To differentiate start & end flags from data, a bit '1' is stuffed after 5 1's.



There is single error in given frame. Choice (C)

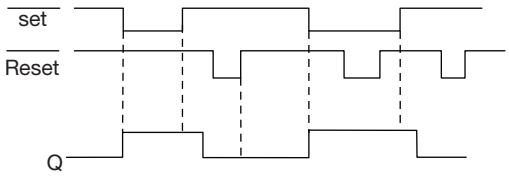
34. Consider the delay of each NAND gate is 'n' seconds.
At $t = 0$, the logic LOW switched to logic HIGH
The wave forms will be as shown below.
X is input of NAND gate, other input will be X^1 which is complemented form of X, but delayed by $3n$. (n – delay of each NAND gate)



HIGH to LOW to HIGH Choice (D)

35. Given Latch is a $\overline{S}\overline{R}$ NAND gate latch.

$\overline{\text{Set}}$	$\overline{\text{Reset}}$	Q_{n+1}	Condition
0	0	X	$(Q_{n+1} = 1, \bar{Q}_{n+1} = 1)$
0	1	1	Set
1	0	0	Reset
1	1	Q_n	Same State



Choice (B)

36. Given, 1, 4 and 5 are the eigenvalues of A.
$\therefore$ The eigenvalues of $A^2 - 5A + 6I_3$ are $1^2 - 5 \times 1 + 6 = 2$, $4^2 - 5 \times 4 + 6 = 2$ and $5^2 - 5 \times 5 + 6 = 6$.
Hence, the eigenvalue of $A^2 - 5A + 6I_3$ are 2, 2 and 6
$\therefore$ $A^2 - 5A + 6I_3$ has two distinct eigenvalues.
Choice (B)

37. Consider option (A):
$(p \wedge q) \to [(p \vee q) \vee (\neg p \wedge \neg q)]$
$\Leftrightarrow (p \wedge q) \to [(p \vee q) \vee \neg (p \vee q)]$
$(\because \neg (A \vee B) \Leftrightarrow (\neg A \wedge \neg B)$
$\Leftrightarrow \neg (p \wedge q) \vee T$
$(\because A \to B \Leftrightarrow \neg A \vee B$ and $A \vee \neg A \Leftrightarrow T$ = tautology)
$\Leftrightarrow T$ = Tautology $(\because A \vee T \Leftrightarrow T)$
Consider (B):
$[p \wedge (q \vee r)] \vee [\neg p \vee (\neg q \wedge \neg r)]$
$\Leftrightarrow [p \wedge (q \vee r)] \vee [\neg p \vee \neg (q \vee r)]$
$(\because \neg (A \vee B) \Leftrightarrow (\neg A \wedge \neg B))$
$\Leftrightarrow [p \wedge (q \vee r)] \vee \neg [p \wedge (q \vee r)]$
$\Leftrightarrow T$ = Tautology $(\because A \vee \neg A \Leftrightarrow T)$
Consider (C):
$[(p \vee q) \to r] \leftrightarrow [\neg r \to \neg (p \vee q)]$
$\Leftrightarrow [(p \vee q) \to r] \leftrightarrow [(p \vee q) \to r]$
$(\because A \to B \Leftrightarrow \neg B \to \neg A)$
$\Leftrightarrow T$ = Tautology $(\because A \leftrightarrow A \Leftrightarrow T)$

Consider (D):
$[p \to (q \to r)] \wedge [\neg p \vee q \vee r]$
When p is true, q is true and r is false
$p \to (q \to r)$ is false.
$\therefore$ $[p \to (q \to r)] \wedge [\neg p \vee q \vee r]$ is false.
Hence $[p \to (q \to r)] \wedge [\neg p \vee q \vee r]$ is NOT a tautology. Choice (D)

38. Let X_1, X_2 and X_3 denote the number appeared on the die in the first, second and third rolls respectively.
$\therefore$ X_1, X_2 and X_3 take the values 1, 2, 3, 4, 5 and 6 with equal probability $\frac{1}{6}$.
$\therefore$ $E(X_1) = E(X_2) = E(X_3)$

$$= 1\times\frac{1}{6} + 2\times\frac{1}{6} + 3\times\frac{1}{6} + 4\times\frac{1}{6} + 5\times\frac{1}{6} + 6\times\frac{1}{6} = \frac{7}{2}$$

$\therefore$ The expected value of the product of numbers that appear on the die when rolled thrice
$= E(X_1 X_2 X_3) = E(X_1) \cdot E(X_2) \cdot E(X_3)$

$$= \frac{7}{2}\times\frac{7}{2}\times\frac{7}{2} = \frac{343}{8}$$

Choice (C)

39. Given $f(x) = (x-1)^2 e^{-x}$
$f'(x) = 2(x-1)e^{-x} - (x-1)^2 e^{-x}$
$f'(x) = (x-1)(3-x)e^{-x} = (4x - x^2 - 3)e^{-x}$
$f'(x) = 0 \Rightarrow (x-1)(3-x)e^{-x} = 0$
$\Rightarrow$ $(x-1)(3-x) = 0$
$\Rightarrow$ $x = 1; x = 3$
And $f''(x) = (4-2x)e^{-x} - (4x - x^2 - 3)e^{-x}$
$= (x^2 - 6x + 7)e^{-x}$

At $x = 1, f''(x) = 2e^{-1} = \frac{2}{e} > 0$

At $x = 3; f''(x) = -2e^{-3} = \frac{-2}{e^3} < 0$

$\therefore$ $f(x)$ has a local maximum at $x = 3$
$\therefore$ The maximum value of
$f(x)$ at $x = 3$ is $f(3) = (3-1)^2 e^{-3} = \frac{4}{e^3}$

$= 0.1991$

Ans: 0.18 to 0.20

40. Given $A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$, $C = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$
and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
And $G = \{A, B, C, I\}$
As the binary operation is "matrix multiplication",
$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is the identity element of G
$\therefore$ I can't be a generator of G.

Consider $A^2 = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$

$\Rightarrow$ $S(A) = 2$
$\therefore$ A can't be a generator of G, because the order of the generator of a cyclic group is same as that of the order of G.
Also, one can observe that
$B^2 = A$, $B^3 = C$, and $B^4 = I$; $C^2 = A$, $C^3 = B$ and $C^4 = I$
Hence, B and C are the generators of the cyclic group G under matrix multiplication.
Choice (B)

41. $F(x, y, z) = \Sigma m(0, 6, 7) + \phi(1, 4)$

X \ YZ	00	01	11	10
0	1	D		
1	D		1	1

$F = \bar{X}\bar{Y} + XY = X \odot Y$
F is 2 input X NOR gate, so we need 4 NOR gates.
Choice (B)

42. Propagation delay = 100 ms
Round-trip delay = 200 ms
File size = 10 MB
Frame size = 1 KB

$$\text{Frames required to send the file} = \frac{10\times10^6}{1\times10^3} = 10000$$

Time to send 10000 frames

$$= \frac{10000}{5} * 200 \text{ ms}$$

$= 2000 * 200$ ms $= 400$ seconds

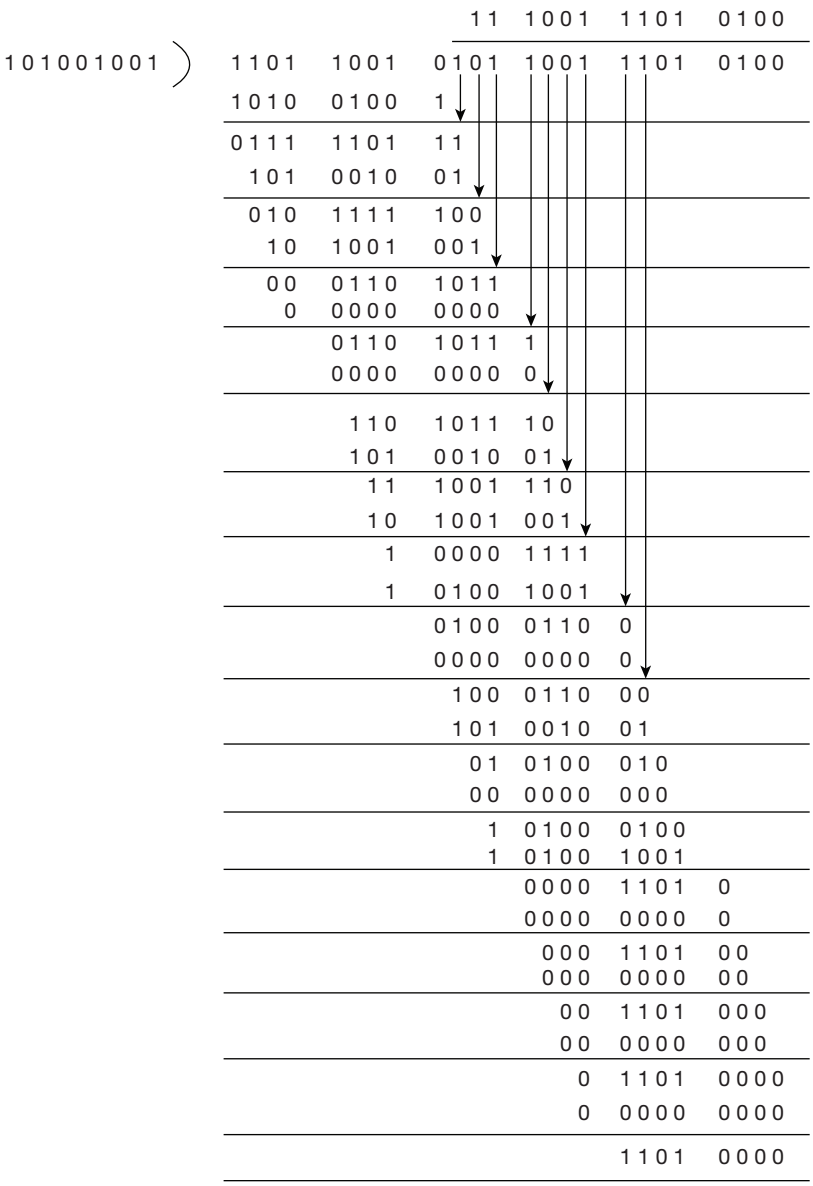
$$\text{Throughput of } A = \frac{\text{File Size}}{\text{Time Required to send file}}$$

$$= \frac{10 \text{ MB}}{400 \text{ s}} = 0.025 \text{ MBps} = 25 \text{ KBps}$$

Ans : 25

43. (i) Even if P_1 calls close(), the OS will transmit data to P_2.
(ii) The OS will send FIN (finish) to P_1
(iii) The receive () function will be called multiple times to receive the entire data.
(iv) P_2's receive will return a zero to indicate an end of stream. Choice (D)

44. Given message can be written as:
1101 1001 0101 1001
CRC generator is 1010 01001
We need to put 8 zeros next to the message and perform modulus division with given CRC generator.



∴ The check sum that will be placed after the message is 11010000 Ans : 11010000.

45. Given turing machine writes a Blank in first '*a*' position and traverses next *a*'s, *b*'s and #'s. Again replaces two *a*'s with #'s and traverses next *a*'s, *b*'s and #'s; Again replaces 3 *a*'s with #'s. So the language accepted is $\{a^n\ b\ a^{2n}\ b\ a^{3n} \mid n \geq 0\}$ Choice (C)

46. (i) Regular languages do not count prime number of 1's (by using its limited storage).
(ii) We can design a FA which accepts the strings such that every odd position is 1. So it is regular.
(iii) Sudoku is finite. So it is regular.
(iv) We can design a FA, in which number of *a*'s is 1, 5, 9, 13 etc. so (iv) is regular. Choice (B)

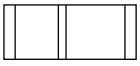
47. Combining *D* and *X* stages reduces miss prediction penalty, (Penalty reduce from 2 to 1). Combining *X* and *M* stages eliminates load-to-use stall cycle. (No stall to use a load value).
Combining *M* & *W* stages, will reduce By Pass Path.
By Combining *F* & *D* stages, BTB is not required to determine the branch instruction. Choice (C)

48. Average latency of direct mapped cache with 15% miss rate
= (3 + 0.15 ∗ 10) = 3 + 1.5 = 4.5 cycles
Average latency of set associative cache with miss rate '*x*' is (4 + *x* ∗ 10) = 4.5
x ∗ 10 = 0.5
⇒ *x* = 0.05 = 5% Ans: 5

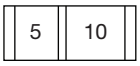
49. CPI on *P*1 = 1.2
CPI on *P*2 = 1.2 + 0.1 ∗ 0.1 ∗ (5 – 3)
= 1.2 + 0.01 ∗ 2
= 1.2 + 0.02 = 1.22
(∴ 10% of branch instructions, 10% mis-predictions and 5 cycles penalty). Ans: 1.22

50. BCNF mainly focuses on the candidate keys.
Choice (B)

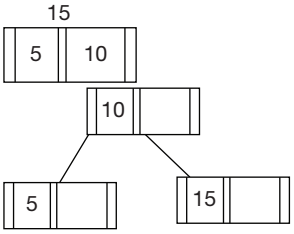
51.



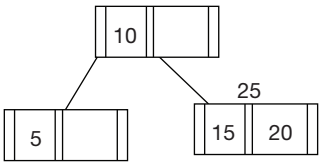
Insert: 5, 10

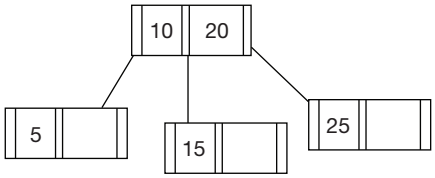


Insert : 15

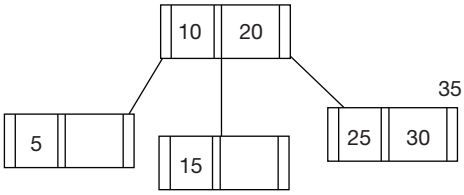


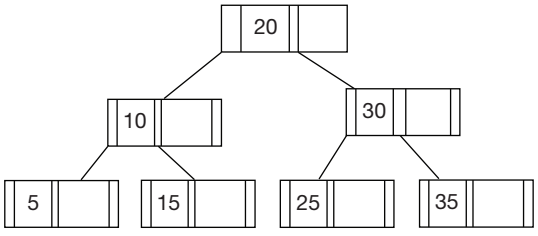
Insert: 20, 25



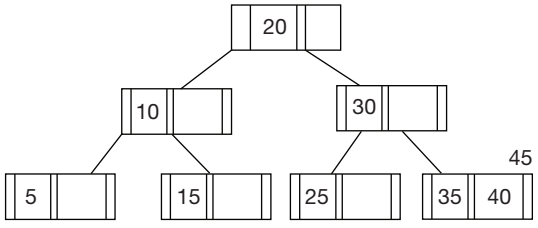


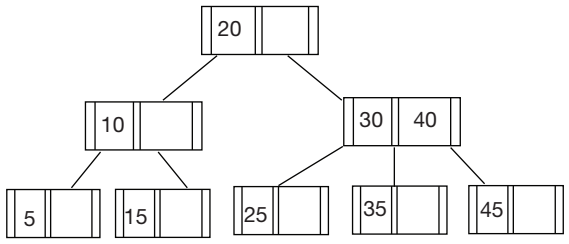
Insert: 30, 35



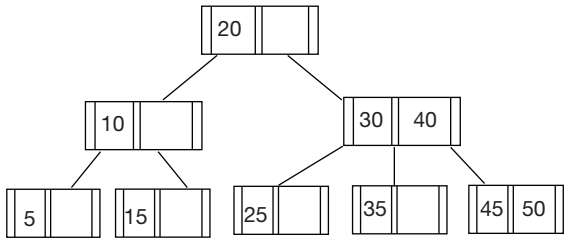


Insert: 40, 45





Insert: 50



Number of nodes at last level are 5. Ans: 5

52. Choice (A)

53. Post-fix order = Traverse left sub trees, Right sub tree and then Root
Infix order = Traverse left sub tree, Root and then Right sub tree Choice (C)

54. The input is 36, 97, 44, 12, 58, 49, 11, 84
Bubble sort:
1st pass
36, 97 44, 12, 58, 49, 11, 84
36, 97, 44, 12, 58, 49, 11, 84
36, 44, 97, 12, 58, 49, 11, 84
36, 44, 12, 97, 58, 49, 11, 84
36, 44, 12, 58, 97, 49, 11, 84
36, 44, 12, 58, 49, 97, 11, 84
36, 44, 12, 58, 49, 11, 97, 84
36, 44, 12, 58, 49, 11, 84, 97
Similarly, 2nd pass results
36, 12, 44, 49, 11, 58, 84, 97
3rd pass results
12, 36, 44, 11, 49, 58, 84, 97
4th pass results
12, 36, 11, 44, 49, 58, 84, 97
Selection sort:

36, 97, 44, 12, 58, 49, 11, 84
1st pass results in

Swap
11, 97, 44, 12, 58, 49, 36, 84
2nd pass results in

Swap
11, 12, 44, 97, 58, 49, 36, 84
3rd pass results in

11, 12, 36, 97, 58, 49, 44, 84

4^{th} pass results in
11, 12, 36, 44, 58, 49, 97, 84
Insertion sort
1^{st} pass

36, 97, 44, 12, 58, 49, 11, 84

2^{nd} pass

36, 97, 44, 12, 58, 49, 11, 84

3^{rd} pass

36, 44, 97, 12, 58, 49, 11, 84

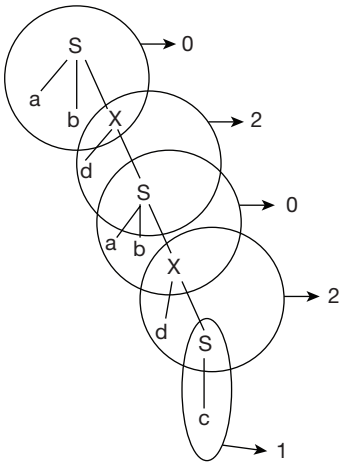
4^{th} pass

12, 36, 44, 97, 58, 49, 11, 84 Choice (D)

55. Number of labeled spanning trees of the complete bipartite graph k_{mn} is $m^{n-1} \cdot n^{m-1}$.

For $k_{3,3}$, the number of labeled spanning trees will be $3^{3-1} \cdot 3^{3-1} = 81$. Ans: 81

56. Input string *a b d a b d c*



The output is 1 2 0 2 0 Choice (A)

57. (P) Has SR conflict
(Q) Q is a LR(0) grammar
(R) Has both RR and SR conflicts Choice (C)

58. Choice (B)

59. Choice (C)

60.

4	4	4	2
3	3	3	3
2	6	7	7
1	1	1	1
4 PF	1 PF	1 PF	1 PF

Ans.: 7

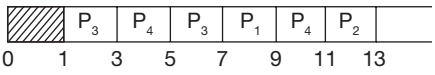
61. Preemptive SJF

Average response time $= \frac{7+15+1+10}{4} = 8.25$

Preemptive priority scheduling:

Average response time $= \frac{4+7+1+2}{4} = 3.5$

Round Robin Scheduling



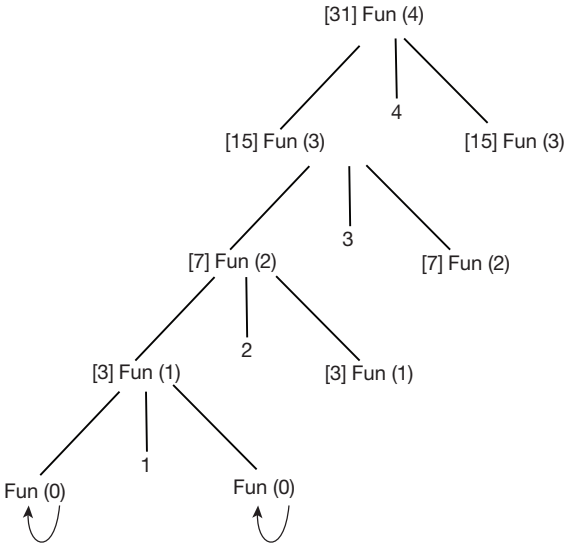
Ready Queue:

$P_4, P_3, P_1, P_4, P_2, P_3, P_1, P_4$

Average response time $= \frac{7+11+1+3}{4} = 5.5$

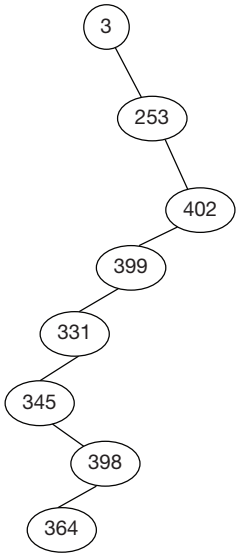
Choice (C)

62.

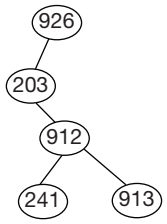


[x] specifies number of function calls of the functions.
Ans: 31

63. Option (A)



Option (B)



913 is violating node. Choice (B)

64. Choice (C)

65. One window can be sent for every 40 m sec

1 window ——— 40×10^{-3} sec

x ——— 1 sec

$$x = \frac{1}{40 \times 10^{-3}} = \frac{10^3}{40}$$

$$= \frac{1000}{40} = 25$$

Per one second 25 windows can be sent, maximum rate of (25 × 65, 535) bytes can be sent in a second. i.e., 1638375. Choice (C)