

Test Booklet No. _____

This booklet consists of 100 questions and 19 printed pages.

RGUCET/2024/___/___

Series

NIL

RGUCET 2024
Common Entrance Test, 2024
MASTER OF TECHNOLOGY (COMPUTER SCIENCE AND
ENGINEERING)

Full Marks: 100

Time: 2 Hours

Roll No.

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Day and Date of Examination: _____

Signature of Invigilator(s) _____

Signature of Candidate _____

General Instructions:

PLEASE READ ALL THE INSTRUCTIONS CAREFULLY BEFORE MAKING ANY ENTRY.

1. DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Candidate must write his/her Roll Number on the space provided.
3. This Test Booklet contains 100 Multiple Choice Questions (MCQs) from the concerned subject. Each question carries 1 mark. There shall be negative marking of 0.25 against each wrong attempt.
4. Please check the Test Booklet to verify that the total pages and total number of questions contained in the test booklet are the same as those printed on the top of the first page. Also check whether the questions are in sequential order or not.
5. Candidates are not permitted to enter into the examination hall after the commencement of the entrance test or leave the examination hall within one hour thirty minutes.
6. Making any identification mark in the OMR Answer Sheet or writing Roll Number anywhere other than the specified places will lead to disqualification of the candidate.
7. Candidates shall maintain silence inside and outside the examination hall. If candidates are found violating the instructions mentioned herein or announced in the examination hall, they will be summarily disqualified from the entrance test.
8. In case of any dispute, the decision of the Entrance Test Committee shall be final and binding.
9. The OMR Answer Sheet consists of two copies, the Original copy and the Student's copy.

1	<p>Instructions: Indicate whether the following statements about general English are True or False.</p> <p>A A complete sentence must always contain a verb. B Homophones are words that have the same spelling but different pronunciations. C Articles ("a,""an,""the") are always necessary before nouns. D The past tense is always used to talk about events that happened in the past.</p>				Answer option (a)										
	a) A-True, b-False, C-False, D-True	b)A-True, b-False, C-True, D-True	c)A-True, b-False, C-False, D-False	d)A-False, b-False, C-False, D-True	A-True, b-False, C-False, D-True										
2	<p>Which punctuation mark indicates a pause longer than a comma but shorter than a full stop?</p>				Answer option (b)										
	a)Semicolon (;)	b)Colon (:)	c)Dash(-)	d)Ellipsis(...)	Colon (:)										
3	<p>Instructions: Indicate whether the following statements about general English are True or False.</p> <p>A Italics are used to indicate emphasis in writing. B The colon (:) should always be followed by a complete sentence C A synonym is a word with the opposite meaning. D Exclamation points (!) should be used sparingly in formal writing</p>				Answer option (a)										
	a)A-True, B-False, C-False, D-True	b)A-False, B-False, C-False, D-True	c)A-True, B-False, C-False, D-False	d)A-True, B-True, C-False, D-True	A-True, B-False, C-False, D-True										
4	<p>For each word in column 1, find the matching antonym in column 2:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"><i>Column 1</i></th> <th style="width: 50%;"><i>Column 2</i></th> </tr> </thead> <tbody> <tr> <td>1) Day</td> <td>P) Sleep</td> </tr> <tr> <td>2)Fast</td> <td>Q) Slow</td> </tr> <tr> <td>3) Darkness</td> <td>R) Brightness</td> </tr> <tr> <td>4) rise</td> <td>S) Night</td> </tr> </tbody> </table>				<i>Column 1</i>	<i>Column 2</i>	1) Day	P) Sleep	2)Fast	Q) Slow	3) Darkness	R) Brightness	4) rise	S) Night	c)
<i>Column 1</i>	<i>Column 2</i>														
1) Day	P) Sleep														
2)Fast	Q) Slow														
3) Darkness	R) Brightness														
4) rise	S) Night														
	a) 1-P, 2-Q, 3-R, 4-S	b) 1-Q, 2-Q, 3-R, 4-S	c) 1-S, 2-Q, 3-R, 4-P	d)1-P, 2-Q, 3-R, 4-S	1-S, 2-Q, 3-R, 4-P										
5	<p>Assertion (A): When lightning strikes, the sound is heard a little after the flash is seen. Reason (R): The velocity of light is greater than that of the sound.</p>				d)										
	a) A is True	b) R is True	c) None are True	d) Both A and R are true	Both A and R are true										
6	<p>Choose the most appropriate word from the options given below to complete the following sentence.</p>				c)										

	He could not understand the judges awarding her the first prize, because he thought that her performance was quite _____.				
	a) superb	b) medium	c) mediocre	d) exhilarating	mediocre
7	Identify the segment(s) in the following sentence that contains a grammatical error: The lady at the saloon / padded my thin hair / with artificial hairs / to make them appear fluffy. A. The lady at the saloon B. padded my thin hair C. with artificial hairs D. to make them appear fluffy				d)
	a) B only	b) D only	c) B and D only	d) C and D only	C and D only
8	Choose the most appropriate word from the options given below to complete the following sentence: If we manage to _____ our natural resources, we would leave a better planet for our children.				d)
	a) uphold	b)restrain	c)cherish	d) conserve	conserve
9	In which state Covid-19 case was first reported in India?				c)
	a) Delhi	a) M aharashtra	c) Kerala	b) Karnatak a	Kerala
10	In a bar chart, the gap between the bars is always:				a)
	a) Same	b) Zero	c) Varies	d) Not same	Same
11	Fresh fruit contains 70% water and dry fruit contains 40% water. How much dry fruit can be obtained from 100 kg of fresh fruits?				d
	a) 40 kg	b) 52 kg	c) 18 kg	d) 50 kg	50 kg
12	In a certain coding method, "ITANAGAR" is written as "FQXXDXO". In this coding, what is the code word for "PASIGHAT".				a
	a) MXPFDXQ	b) MXPIDE XQ	c) MXPFDEAQ	d) MXPFGEXQ	MXPFDXQ
13	$5^0 \times 8 =$				c
	a) 0	b) 40	c) 8	d) 20	8
14	A boat travels with a speed of 12 km/hr in still water. If the speed of the stream is 3 km/hr, the time taken by the boat to go 81 km upstream.				
	a) 9 hrs	b) 5.4 hrs	c) 6.7hrs	d) 27 hrs	a

15	What will be the cost price of a ball if on selling 15 balls at Rs. 500, there is a loss equal to the cost price of 10 balls.				Answer option (a,b,c or d)
	a) Rs. 100	b) Rs. 50	c) Rs. 250	d) Rs. 550	a
16	In which year Mahatma Gandhi returned to India?				d
	a)1932	b)1875	c)1921	d)1915	1915
17	Which of following rivers is the longest in India?				d
	a) Ravi	b) Brahmaputra	c) Kaveri	d) Ganga	Ganga
18	Which of the following is equal to y^4 ?				c)
	a) $y^6 - y^2$	b) $y^6 \cdot y^2$	c) y^6 / y^2	d) $(y^6)^2$	y^6 / y^2
19	If 'X' is inversely proportional to 'Y' and 'Y' is inversely proportional to 'Z', then				b)
	a) 'X' is inversely proportional to 'Z'	b) 'X' is directly proportional to 'Z'	c) 'X' is directly proportional to 'YZ'	d) 'X' is constant	'X' is directly proportional to 'Z'
20	Choose the appropriate word: If you are trying to make a strong impression on your audience, you cannot do so by being understated, tentative or _____				b)
	a) Hyperbolic	b) Restrained	c) Argumentative	d) Indifferent	Restrained
21	A cache has 57 cache hits and 5 cache misses over a period of 3 seconds. The hit ratio is:				a
	A. 0.919	B. 0.87	C. 0.845	D. 0.92	0.919
22	Match the following columns:				
	Column 1		Column 2		
	P: Indirect addressing		1. Array Implementation		a
	Q: Indexed addressing		2. Writing relocatable code		
	R: Base register addressing		3. Passing array as parameter		
	a) P-3, Q-1, R-2	b) P-2, Q-3, R-1	c) P-3, Q-2, R-1	d) P-1, Q-3, R-2	P-3, Q-1, R-2
23	Which of the following statements are true? A. Direct-mapped cache has a higher hit ratio compared to fully associative cache for the same cache size. B. In a multicore processor, each core shares the same Level 1(L1) cache but has its own dedicated level 2 (L2) cache.				d

	<p>C. SIMD (Single Instruction, Multiple Data) architectures are particularly well-suited for applications involving vector processing and multimedia tasks.</p> <p>D. The Amdahl's Law states that the overall performance improvement gained by optimizing a single part of a system is limited by the fraction of time that the improved part is actually used.</p>												
	a) A and B	b) B and C	c) A, B and D	d) C and D	C and D								
24	<p>For the given statements, which of the following is correct?</p> <p>A: The Von Neumann architecture is characterized by the use of a single shared bus for both instructions and data.</p> <p>B: The Von Neumann architecture relies on a separate bus for instructions and data to achieve efficient data transfer.</p>				c								
	a) Both A and B are true, and B is the correct explanation for A.	b) Both A and B are true, but B is not the correct explanation for A.	c) A is true but B is false	d) A is false but B is true	A is true but B is false								
25	<p>The memory access to main memory on a cache "miss" takes 20ns and a "hit" takes 3ns. If 70% of the processor's memory requests result in a cache hit, then the average memory access time is:</p>				c								
	a) 2.5ns	b) 25.4ns	c) 8.1ns	d) 11.2ns	8.1ns								
26	<p>In the case of, Zero-address instruction method the operands are stored in</p>				c								
	a) Registers	b) Accumulators	c) Push down stack	d) Cache	Push down stack								
27	<p>Match the following pairs:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">A. Cache Coherence</td> <td style="width: 50%;">i. The organization and design of a specific implementation of a CPU.</td> </tr> <tr> <td>B. Superscalar Processing</td> <td>ii. Dividing the execution of instructions into stages to improve CPU throughput.</td> </tr> <tr> <td>C. Microarchitecture</td> <td>iii. A technique that allows multiple instructions to be executed simultaneously in a single CPU core.</td> </tr> <tr> <td>D. Pipelining</td> <td>iv. The consistency of data in different caches across multiprocessor system.</td> </tr> </table>				A. Cache Coherence	i. The organization and design of a specific implementation of a CPU.	B. Superscalar Processing	ii. Dividing the execution of instructions into stages to improve CPU throughput.	C. Microarchitecture	iii. A technique that allows multiple instructions to be executed simultaneously in a single CPU core.	D. Pipelining	iv. The consistency of data in different caches across multiprocessor system.	a
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D. Pipelining	iv. The consistency of data in different caches across multiprocessor system.												

	a) A-iv, B-iii, C-i, D-ii	b) A-ii, B-iii, C-iv, D-i	c) A-iii, B-i, C-iv, D-ii	d) A-I, B-iii, C-iv, D-ii	A-iv, B-iii, C-i, D-ii
28	<p>Find which of the following statements are true:</p> <p>A. The MIPS (Microprocessor without Interlocked Pipeline Stages) architecture uses a load/store instruction format where arithmetic operations are performed directly on memory.</p> <p>B. Deeper pipelines always result in better performance compared to shallower pipelines due to increased parallelism.</p> <p>C. The x86 instruction architecture uses a combination of variable-length instructions and fixed-length instructions.</p> <p>D. Pipeline bubbles or stalls occur when a pipeline stage cannot proceed due to a dependency or hazard, resulting in wasted clock cycles.</p>				b
	a) A only	b) C and D	c) B and D	d) A and C	C and D
29	<p>For the given statements, choose the correct answer:</p> <p>A: A computer system has a main memory with a total capacity of 1GB (Gigabyte) and a cache memory with a total capacity of 256 KB (Kilobytes). The cache uses a block size of 64 bytes.</p> <p>B: If the cache is organized as a direct-mapped cache with a cache line size of 64 bytes, the number of cache lines is 4096.</p>				a
	a) Both A and B are true, and B is the correct explanation for A.	b) Both A and B are true, but B is not the correct explanation for A.	c) A is true but B is false	d) A is false but B is true	a) Both A and B are true, and B is the correct explanation for A.
30	<p>Consider a uniprocessor system where new processes arrive at an average of five processes per minute and each process needs an average of 6 seconds of service time. What will be the CPU utilization ?</p>				b)
	a) 60 %	b) 50 %	c) 40%	d) 80%	50 %
31	<p>The output of a sequential circuit depends on</p> <p>(A) present input only</p> <p>(B) past input</p>				(c)
	(a) A is True	(b) B is True	(c) Both A and B are True	(d) None are True	Both A and B are True
32	<p>A byte addressable computer has a memory capacity of 2m Kbytes and can perform 2n operations. An instruction involving 3 operands and one operator needs a maximum of</p>				(d)
	(a) 3m bits	(b) m + n bits	(c) 3m + n bits	(d) 3m + n + 30 bits	3m + n + 30 bits

3	Which of the following flip-flops is free from race condition?				(a)
3	Type Questions here for matching pairs:				
	A. T flip-flop	1.Data Storage			
	B. SR flip-flop	1.Set- Reset Register			
	C. Master-slave JK flip-flop	1.free from race condition			
	D. D Flip Flop	1.Counter			
	(a) A-iv, B-ii, C-iii, D-i	(b) A-i, B-ii, C-iii, D-iv	(c) A-iv, B-iii, C-i, D-ii	(d) A-iv, B-ii, C-iv, D-iii	A-iv, B-ii, C-iii, D-i
3	(A)Assertion: One of the main features that distinguish microprocessor from micro-computers is microprocessor does not contain I/O devices.				(c)
4	(R) Reason: Microprocessor is the processing unit of the computer.				
	(a) A is Valid answer	(b) R is Valid answer	(c) Both A and R is valid answer	(d) None of the above.	Both A and R is valid answer
3	$(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ is equivalent to				Answer option (c)
5	a) $S \wedge R$	b) $S \rightarrow R$	c) $S \vee R$	d) None of these	$S \vee R$
3	Statement: Informed search algorithms offer advantages over uninformed search because:				Answer option (d)
6	<p>A They explore the search space in a completely random order.</p> <p>B They prioritize searching areas that appear closer to the goal based on a heuristic function.</p> <p>C They are guaranteed to find the optimal solution (shortest path, lowest cost) in all cases.</p>				
	a) A:False, A:True , A:False	b)A:True, B:True , C:False	c)A:False, B:False, C:False	d)A:True,B:True,C:True	A:True,B:True, C:True
3	Assertion (A): Communication between agents can always improve their overall performance in achieving a common goal.				Answer option (b)
7	Reason (R): Sharing information and coordinating actions can lead to more efficient solutions for multi-agent tasks.				
	a) A is True, R is True	b) Only R is True	c) Only A is True	d) None of the above	Only R is True
3	Some search algorithms combine elements of both uninformed and informed search strategies. An example of such a hybrid approach is:				Answer option (a)
8	a)Bidirectional Search (BFS from start and goal states)	b)A* search with a perfect heuristic	c)Depth-limited search with a fixed depth limit	d)Iterative deepening search with increasing depth limits	Bidirectional Search (BFS from start and goal states)

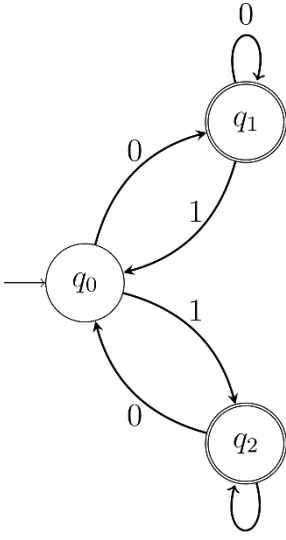
39	A heuristic function $h(x)$ is considered admissible for a search problem if:				Answer option (a)
	a)It always overestimates the true cost to reach the goal from any state (x)	b)It always underestimates the true cost to reach the goal from any state (x)	c)It can sometimes overestimate and sometimes underestimate the cost.	d)It only considers the distance from the current state to the goal.	It always overestimates the true cost to reach the goal from any state (x)
40	Match the Columns value on the left with correct values on the right:				Answer option (d)
	A Designing video game levels with interesting challenges		i Multi-Agent Pathfinding		
	B Optimizing resource allocation in a complex network		iiAnytime Search		
	C Planning routes for autonomous vehicles in dynamic traffic		iiiPareto Frontier Search		
	D Real-time decision making in a first-person shooter game		IvLearning Real-Time Search (LRTS)		
	a)A -iii,B-ii,C-iv, D-i	b)A -iii,B-iv,C-i, D-ii	c)A-ii,B-i,C-iv, D-iii	d) A-iii,B-i,C-iv, D-ii	A-iii,B-i,C-iv, D-ii
41	Uninformed search algorithms are well-suited for problems with: A Well-defined heuristics to estimate distance to the goal. B Limited state spaces where all states can be easily explored. C Complex decision-making requiring reasoning about past experiences.				Answer option (a)
	a)A:False, B:True,C:False	b)A:True, B:True,C:False	c)A:False, B:True,C:True	d)A:True, B:True,C:True	A:False, B:True,C:False
42	Assertion (A): A learning agent can improve its performance over time by adapting its behavior based on experience. Reason (R): A rational agent always makes the best possible choice based on its current knowledge and the environment.				Answer option (a)
	a) A is True, R is True	b) A is True, B is False	c) A is False, B is False	d) A is False, B is True	A is True, R is True
43	What is a major challenge in knowledge representation for AI?				Answer option (b)
	a)Efficiently storing a large number of simple facts.	b)Representing the common-sense knowledge	c)Accurately representing complex mathematical formulas.	d)Handling continuously changing and dynamic information.	Representing the common-sense knowledge humans possess.

		e humans possess.			
4 4	Match the Columns value on the left with correct values on the right:				Answer option (a)
	A $x^2 - 4x + 4 = 0$		i $y < 3$		
	B $3y + 5 < 14$		ii $x = 2.5$ or $x = -0.5$		
	C $ 2x - 3 = 5$		iii $x = 2, y = -1$		
	D $x + 2y = 4; y = -1$		iv $x = 2$		
	a) A -iv, B- i , C- ii , D -iii	b)A -i, B- iv , C- ii , D -iii	c)A -iv, B- ii , C- i , D -iii	d)A -iv, B- i , C- iii , D -ii	A -iv, B- i , C- ii , D -iii
4 5	Statement 1: If $f(x)$ is strictly increasing and $g(x)$ is strictly decreasing, then their composite function $h(x) = g(f(x))$ is strictly increasing. Statement 2: The composite function of two continuous functions is always continuous. A Statement 1 is False, Statement 2 is False B Statement 1 is True, Statement 2 is True C Statement 1 is True, Statement 2 is False D Statement 1 is False, Statement 2 is True				Answer option (d)
	a) A	b) B	c) C	d) D	D
4 6	Assertion (A): The power set of a set with n elements always has 2^n elements. Reason (R): The power set includes all possible subsets of the original set, including the empty set.				Answer option (a)
	a) A is True, R is True	b) A is True, R is False	c) A is False, R is True	d) A is False, R is False	A is True, R is True
4 7	Let $R \rightarrow R$ be defined by, then the value of $f(-1.75) + f(0.5) + f(1.5)$ is , $f(x) = \begin{cases} x + 2 & x \leq -1 \\ x^2 - 1 & -1 < x \leq 1 \\ 2 - x & x \geq 1 \end{cases}$				Answer option (c)
	a) 0	b) 2	c) 1	d) -1	1
4 8	The number of binary relations on a set with n elements is				Answer option (c)
	a) n^2	b) 2^n	c) 2^{n^2}	d) none of these	2^{n^2}
4 9	Match the Columns value on the left with correct values on the right:				Answer option (a)
	A $3x^2 + 5x - 2$		i Irrational number		
	B $2\sqrt{5}$		ii Binomial expression with a common factor		
	C $x + (y + z)$		iii Monomial		
	D xy^2		iv Quadratic expression		
	a) A-iv , B-i, C-ii, D- iii	b)A-i , B- iv, C-ii, D- iii	c) A-iv , B-ii, C-i, D-iii	d)A-iv , B-i, C- iii, D-ii	A-iv , B-i, C-ii, D-iii

50	Statement 1: A function $f(x) = x^2$ is injective but not surjective. Statement 2: A bijective function (one-to-one and onto) necessarily has an inverse function. A Statement 1 is True, Statement 2 is True B Statement 1 is True, Statement 2 is False C Statement 1 is False, Statement 2 is True D Statement 1 is False, Statement 2 is False	Answer option (a)
	a) A b) B c) C d) D	A
51	Assertion (A): If set A is a subset of set B, then the Venn diagram representing them will show A completely inside B. Reason (R): Every element in set A must also be an element in set B for A to be a subset.	Answer option (a)
	a) A and R are True b) A is True and R are False c) A and R are False d) None of the above	A and R are True
52	If A and B are sets and $A \cup B = A \cap B$, then	Answer option (c)
	a) $A = \emptyset$ b) $B = \emptyset$ c) $A=B$ d) None of these	$A=B$
53	Which sorting algorithm has the same average-case and worst-case running time:	Answer option (b)
	a) Bubble Sort b) Merge sort c) Quick sort d) Insertion sort	Merge sort
54	In a binary search tree, the in-order and pre-order traversal sequences are D, F, B, A, G, E, H, C and A, B, D, F, C, E, G, H respectively. The post-order traversal sequence is:	Answer option (b)
	a) H, G, E, C, F, D, B, A b) F, D, B, G, H, E, C, A c) C, H, E, G, A, B, F, D d) G, H, E, C, F, D, B, A	F, D, B, G, H, E, C, A
55	Suppose n data items A_1, A_2, \dots, A_n are sorted, i.e. $A_1 < A_2 < \dots < A_n$. Assume the items are inserted into an empty binary search tree. What is the worst-case running time to search an element?	Answer option (a)
	a) $O(n)$ b) $O(\log n)$ c) $O(n \log n)$ d) $O(n^2)$	$O(n)$
56	Find the minimum number of scalar multiplications required to multiply 4 matrices described by $(r_0, r_1, r_2, r_3, r_4) = (20, 50, 3, 50, 2)$.	Answer option (a)
	a) 2600 b) 8000 c) 3420 d) 2420	2600
57	Consider the sequences $X = \langle 1, 2, 3, 2, 4, 1, 2 \rangle$ and $Y = \langle 2, 4, 3, 1, 2, 1 \rangle$. The longest common sequence(s) of X and Y are (i) $\langle 2, 3, 2, 1 \rangle$ (ii) $\langle 2, 4 \rangle$	Answer option (d)

	(iii) $\langle 1, 2 \rangle$ (iv) $\langle 2, 4, 1, 2 \rangle$														
	a) Only (i) is true	b) Both (ii) and (iii) are true	c) Only (iv) true	d) Both (i) and (iv) are true	Both (i) and (iv) are true										
5 8	<p>Match List-I with List-II</p> <table border="1"> <thead> <tr> <th>List-I</th> <th>List-II</th> </tr> </thead> <tbody> <tr> <td>(A) Divide and conquer</td> <td>(i) Prim's Algorithm</td> </tr> <tr> <td>(B) Greedy Algorithm</td> <td>(ii) Quick Sort</td> </tr> <tr> <td>(C) Backtracking</td> <td>(iii) Bellman-Ford algorithm</td> </tr> <tr> <td>(D) Dynamic Programming</td> <td>(iv) N-Queen Problem</td> </tr> </tbody> </table> <p>Choose the correct answer from the options given below:</p>				List-I	List-II	(A) Divide and conquer	(i) Prim's Algorithm	(B) Greedy Algorithm	(ii) Quick Sort	(C) Backtracking	(iii) Bellman-Ford algorithm	(D) Dynamic Programming	(iv) N-Queen Problem	Answer option (b)
List-I	List-II														
(A) Divide and conquer	(i) Prim's Algorithm														
(B) Greedy Algorithm	(ii) Quick Sort														
(C) Backtracking	(iii) Bellman-Ford algorithm														
(D) Dynamic Programming	(iv) N-Queen Problem														
	a) A-(i), B-(ii), C-(iv), D-(iii)	b) A-(ii), B-(i), C-(iv), D-(iii)	c) A-(i), B-(iii), C-(iv), D-(ii)	d) A-(iv), B-(ii), C-(iii), D-(i)	d) A-(ii), B-(i), C-(iv), D-(iii)										
5 9	<p>What is the chromatic number of a complete graph with n vertices, where n is an even number?</p>				Answer option (a)										
	a) $n - 1$	b) n	c) $n + 1$	d) $2n - 1$	$n - 1$										
6 0	<p>1. Given below two statements: Assertion (A): The divide and conquer algorithms solve each subproblem many times. Justification (J): Divide and conquer does not store the intermediate results. In the light of the above statements, select the most appropriate answer:</p>				Answer option (d)										
	a) (A) is false, but (J) is true	b) Both (A) and (J) are true, but (J) is not the correct explanation of (A).	c) (A) is true, but (J) is false.	d) Both (A) and (J) are true and (J) is the correct explanation of (A).	Both (A) and (J) are true and (J) is the correct explanation of (A).										
6 1	<p>The maximum height of a red-black Binary Search Tree (BST) with 1024 nodes is:</p>				Answer option (d)										
	a) 10	b) 11	c) 12	d) 20	20										
6 2	<p>How can NFA be converted to DFA?</p>				Answer option b										
	a) Chomsky algorithm	b) subset construction	c) Pumping lemma for	d) Directed Acyclic Graph	subset construction										

			regular languages										
6 3	Consider the following statements about a Moore machine: A Moore machine can recognize a subset of context free languages only. B The output of Moore machine is determined by its current state. C The output of Moore machine is also determined by the current input. D Has less or the same number of states as an equivalent Mealy machine.				Answer option d								
	a) (B) and (C) only	b) (B), (C) and (D) only	c) (A) and (B) only	d) (B) only	(B) only								
6 4	Consider the language $L = \{0^n 1^n : n \geq 0\}$ A: A non-deterministic pushdown automaton can be constructed to recognize L. B: Language L is a context free language				Answer option a								
	a) Both (A) and (B) are true	b) Both (A) and (B) are false	c) (A) is false but (B) is true	d) (A) is true but (B) is false	Both (A) and (B) are true								
6 5	For each entry in the first column, find a suitable grammar in the second column: <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td>A Regular Expressions</td> <td>I Type 0</td> </tr> <tr> <td>B NFA</td> <td>II Type 1</td> </tr> <tr> <td>C CFG</td> <td>III Type 2</td> </tr> <tr> <td>D Mealy Machines</td> <td>IV Type 3</td> </tr> </table>				A Regular Expressions	I Type 0	B NFA	II Type 1	C CFG	III Type 2	D Mealy Machines	IV Type 3	Answer option b
A Regular Expressions	I Type 0												
B NFA	II Type 1												
C CFG	III Type 2												
D Mealy Machines	IV Type 3												
	a) A-I, B-I, C-III, D-II	b) A-IV, B-IV, C-III, D-IV	c) A-I, B-I, C-IV, D-II	d) A-IV, B-IV, C-II, D-IV	A-IV, B-IV, C-III, D-IV								
6 6	The regular expression $((0 + 1)(0 + 1))^*$ represents the language				Answer option b								
	a) 00 01 10 11 followed by 0 or 1	b) Strings with length multiple of 2	c) all strings of $(0,1)^*$	d) 01 10 repeated two times.	e) Strings with length multiple of 2								
6 7	Consider the following grammar: $E \rightarrow E * E \mid E + E \mid a$ A. More than one parse tree is possible for string $a * a + a$ B. Pumping lemma for CFGs can determine ambiguity of a grammar				Answer option a								

	a) (A) is true but (B) is not the correct explanation	b) (A) is true and (B) is the correct explanation	c) (A) is false but (B) is true	d) (A) is false and (B) is false	(A) is true but (B) is not the correct explanation
68	Which of the following regular expressions correctly describe an integer?				Answer option a
	a) $[+-]?[0-9]^+$	b) $[+-][0-9]^*$	c) $[0-9]^+$	d) $[0-9][0-9]^*$	$[+-]?[0-9]^+$
69	Consider the following assertions regarding the Chomsky Normal Form: <ul style="list-style-type: none"> A. CNF can represent Context Free Grammars only B. A production can generate a single terminal or C. A production can generate two non-terminals D. Start symbol can generate ϵ Which of the above assertions are true?				Answer option c
	a) (A), (B) and (C) only	b) (B) and (C) only	c) (A), (B), (C) and (D)	d) (A), (B) and (D) only	(A), (B), (C) and (D)
70	Which of the following options best describe the language recognized by the following automata? <div style="text-align: center;">  </div> <ul style="list-style-type: none"> A) Strings of odd length B) Strings ending with 0's C) Strings ending with 1's D) Strings ending with 01 or 10 				Answer option d
	a) A, B and C only	b) A, B, C and D	c) B, C and D only	d) B and C only	B and C only
71	Assertion: (A) Quick Sort is generally faster in practice compared to other sorting algorithms like Merge Sort and Heap Sort. Justification: (B) Quick Sort has a worst-case time complexity of				Answer option (c)

	O(n ²).				
	a) Both A and B are true, and B is the correct explanation of A.	b) Both A and B are true, but B is not the correct explanation of A.	c) A is true, but B is false.	d) A is false, but B is true.	A is true, but B is false.
7 2	What will be post order traversal of a binary tree T, if preorder and inorder traversals of T are given by AGDNIH and GANDHI respectively?				Answer option (d)
	a)GIHNDA	b)GHNID A	c)GDNIAH	d)GNHIDA	GNHIDA
7 3	A parentheses checker program would be best implemented using				Answer option (b)
	a) List	b) Stack	c) Queue	d) Tree	Stack
7 4	What is the output of following function for a function call statement display(5); <pre>void display(int num) {if (num>1) display(num-1); printf(“ %d ”,num); }</pre>				Answer option (c)
	a) 5 4 3 2 1	b) 5 5 5 5 5	c) 1 2 3 4 5	d) 5	1 2 3 4 5
7 5	What is structured data?				b
	a) Structured data is a type of data that is huge in number and has many inaccurate values	b) Structured data is a type of data that is very less in number and can be stored in proper rows and columns	c) Structured data is a type of data that has inaccurate values but can be stored in rows and columns	d) Structured data is a type of data that has absolute values but can be stored in rows and columns	Structured data is a type of data that is very less in number and can be stored in proper rows and columns
7 6	Which type of machine learning is defined by using only labeled data to predict some outcome?				c
	a) Semi-supervised Machine learning	b) Unsupervised Machine learning	c) Supervised Machine learning	d) Reinforcement Machine learning	Supervised Machine learning

7 7	Decision tree belongs to which of the following machine learning categories? A. Semi-supervised Machine learning B. Unsupervised Machine learning C. Supervised Machine learning D. Reinforcement Machine learning				c
	a) A only	b) B only	c) C only	d) A and D	C only
7 8	Choose the correct matching pairs:				b
	1. Data cleaning	a) First step of data preparation			
	2. Data reduction	b) Second step of data preparation			
	3. Data transformation	c) Third step of data preparation			
	4. Data integration	d) Fourth step of data preparation			
	a) 1-a, 2-b, 3-c, 4-d	b) 1-a, 2-b, 3-d, 4-c	c) 1-b, 2-a, 3-c, 4-d	d) 1-a, 2-c, 3-b, 4-d	1-a, 2-b, 3-d, 4-c
7 9	Choose the correct option: Assertion (A): Descriptive data analysis provides a summary of the raw data set. Reason (R): Descriptive data analysis involves summarizing and organizing data to describe the data set's main features.				a
	a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).	b) Diagnostic data analysis	c) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).	d) Assertion (A) is false, but Reason (R) is true.	Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
8 0	What do you mean by the model planning phase in the life cycle of data analytics?				a
	a) This phase involves creating data sets for training for testing, production, and training purposes	b) This phase involves the processing of big raw data	c) This Phase involves the team which is responsible for evaluating the tools	d) This phase involves the finalization of big raw data	This phase involves creating data sets for training for testing, production, and training purposes
8 1	K-Nearest Neighbors (KNN) is classified as what type of machine learning algorithm?				a
	a) Instance-based learning	b) Parametric learning	c) Non-parametric learning	d) Model-based learning	Instance-based learning

8 2	Which algorithm is best suited for a binary classification problem? A. K-nearest Neighbors B. Decision Trees C. Random Forest D. Linear Regression				b
	a) A only	b) B only	c) A and C	d) C and B	B only
8 3	Assertion (A): AdaBoost improves classification accuracy. Reason (R): AdaBoost is an ensemble learning method that combines multiple weak classifiers to create a strong classifier. By iteratively adjusting weights and focusing on incorrectly classified instances, AdaBoost tends to improve overall classification accuracy. Choose the correct option:				a
	a) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A)	b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).	c) Assertion (A) is true, but Reason (R) is false.	d) Assertion (A) is false, but Reason (R) is true.	Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A)
8 4	In order to invoke a system call, tick which of the following activities need to be performed: P. Copy syscall number to a designated register Q. Pass syscall arguments via registers / stack R. Perform a software interrupt only				d)
	a) P and R only	b) Q and R only	c) P and Q only	d) P, Q and R only	P, Q and R only
8 5	Which of the following statements about Linux processes are true? P. P. Ctrl-C command kills a foreground process. Q. Q. Ctrl-Z command kills a background process. R. R. Ctrl-S command suspends a foreground process.				a)
	a) P only	b) Q only	c) R only	d) P and R only	P only
8 6	In x86 64-bit assembly language programming, how do we execute a system call?				d)
	a) software interrupt int 0x80	b) software interrupt int 128	c) software interrupt int 0x200	d) syscall	syscall
8 7	The purpose of a swap partition in a modern operating system is :				(d)

	a) To swap or replace bad sectors in hard disk	b) It acts as an I/O mechanism for efficient scheduling	c) To store swapped out process IDs.	d) To increase virtual memory of the system	To increase virtual memory of the system									
88	Why is the system function useful in Linux?				d)									
	a) Reports system statistics	b) Print list of system calls	c) Monitor network systems	d) Execute commands from inside a program	Execute commands from inside a program									
89	Consider the following statements about the make command in Linux/UNIX: P. <i>make</i> uses timestamps to identify which files need to be made. Q. <i>make</i> can be used to implement selective recompilation for large software projects. R. <i>make</i> needs a file named <i>mkfile</i> as input.				(c)									
	a) P only	b) P, Q and R	c) P and Q only	d) Q and R only	P and Q only									
90	What is the output of the command below which uses the tr Linux utility? echo "Hello World" tr '[A-Z]' '[a-z]'				(d)									
	a) A-Z a-z	b) Hello	c) Hello WorldZ	d) hello world	Hello world									
91	Which one of the following UNIX/Linux signals cannot be trapped?				(a)									
	a) SIGKILL	b) SIGHUP	c) SIGINT	d) SIGTERM	SIGKILL									
92	How is lifetime of a variable governed by an operating system depending on variable type?				(c)									
	<table border="1"> <thead> <tr> <th>Variable Type</th> <th>Attribute</th> </tr> </thead> <tbody> <tr> <td>P. Local variable</td> <td>1. short lifetime</td> </tr> <tr> <td>Q. Block variable</td> <td>2. lives forever</td> </tr> <tr> <td>R. Thread-local variable</td> <td>3. Programmer controlled</td> </tr> <tr> <td>S. file scope variable</td> <td>4. Used in MT programming</td> </tr> </tbody> </table>		Variable Type	Attribute	P. Local variable	1. short lifetime	Q. Block variable	2. lives forever	R. Thread-local variable	3. Programmer controlled	S. file scope variable	4. Used in MT programming		
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	a) P-1, Q-1, R-1, S-3	b) P-1, Q-2, R-3, S-4	c) P-1, Q-1, R-4, S-2	d) P-1, Q-2, R-1, S-3	P-1, Q-1, R-4, S-2									
93	How many general-purpose registers are there in 8085 microprocessors?				(c)									
	a) 2	b) 4	c) 6	d) 8	6									
94	The full form of RISC is _____				a)									
	a) Reduced instruction set computer	b) Realtime instruction set computer	c) Reduced instruction set computer	d) Rewriting instruction set computer	Reduced instruction set computer									

		n set computer			
9 5	If memory address size = 22 bits and it is 2-byte addressable, then memory size = _____				c)
	a) 2MB	b) 4MB	c) 8MB	d) 16MB	8MB
9 6	Identify which of the following interrupt signals in 8085 processors are maskable? A. TRAP B. RST 7.5 C. RST 6.5 D. INTR				d
	a) A only	b) B and C only	c) A and D only	d) B, C and D only	B, C and D only
9 7	Which of the following instruction cycles are present in 8085 architectures? A. Instruction Fetch B. Instruction Decode C. Instruction Execute D. Instruction pipelining				b
	a) A and B only	b) A, B and C only	c) A, B, C and D only	d) D only	A, B and C only
9 8	Match the following:				b)
	A. Stack pointer	i. contains address of the next instruction to be executed			
	B. Program counter	ii. contains address at the top of the stack			
	C. Limit register	iii. a specific register in some CPU architectures			
	D. Accumulator	iv. Mechanism to allocate process space			
	a) A-ii, B-i, C-iii, D-iv	b) A-ii, B-i, C-iv, D-iii	c) A-iii, B-ii, C-i, D-iv	d) A-iv, B-ii, C-iii, D-i	A-ii, B-i, C-iv, D-iii
9 9	Which of the following statements about the 8085 microprocessor are TRUE? A. The address bus in the 8085 microprocessor is bi-directional B. There are two register pairs to store memory address and other data.				b
	a) A only	b) B only	c) Both A and B	d) Neither A nor B	B only

1 0 0	For each programming construct in column A, identify appropriate addressing modes in column B				a									
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Programming Construct</th> <th style="width: 50%; text-align: center;">Addressing Mode</th> </tr> </thead> <tbody> <tr> <td>I. Constant</td> <td>A. Indirect addressing</td> </tr> <tr> <td>II. Pointer</td> <td>B. Immediate Addressing</td> </tr> <tr> <td>III. Loop</td> <td>C. Auto decrement addressing</td> </tr> <tr> <td>IV. Linked List</td> <td>D. Indexed Addressing</td> </tr> </tbody> </table>					Programming Construct	Addressing Mode	I. Constant	A. Indirect addressing	II. Pointer	B. Immediate Addressing	III. Loop	C. Auto decrement addressing	IV. Linked List	D. Indexed Addressing
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a) I-B, II-A, III-C, IV-A	b) I-B, II-A, III-D, IV-C	c) I-B, II-D, III-A, IV-C	d) I-B, II-D, III-C, IV-A	I-B, II-A, III-C, IV-A										