CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY

Department of Computer Science & Engineering

Class Test – 1   Session- Sep – oct, 2024 Month-Sep

Sem- CSE 3ʳᵈ(AI)/DS

Subject Name - Probability and Statistics

Subject- Code-B127371(022)

Max Marks: 40

Min Marks:14

Time Allowed:2 hrs

Note: -Part A is compulsory, attempt any questions from B,C and D.

CO1: Solve engineering related problems based on concepts of Probability.
C02: Use basic concepts of Probability distribution to solve real life related problems.

Q.N.	Questions	Marks	Levels of Bloom's Taxonomy	COs
	Unit I			
Q1	A bag contains 30 balls numbered 1 to 30. One ball is drawn at random. Determine the probability that the number on the ball drawn will be (a) A multiple of 5 or 7. (b) A multiple of 3 or 7.	[4]	L4	CO1
Q2	Define the probability density function. A continuous random variables X has a probability density function defined by $$f(x) = \begin{cases} \frac{1}{16}(3+x)^2, & if -3 \le x \le -1 \\ \frac{1}{16}(6-2x^2), & if -1 \le x \le 1 \\ \frac{1}{16}(3-x)^2, & if 1 \le x < 3 \\ 0, & elsewhere \end{cases}$$ Verify f(x) is a probability density function and find the mean of the random variable.	[8]	L6	CO1
Q3	State and prove Baye's Theorem. An insurance company insured 2000 scooter driver, 4000 car drivers and 6000 truck drivers. The probability of accidents is 0.01, 0.03 and 0.15 respectively. One of the insured person meets with an accident. What is the probability that he is a scooter driver.	[8]	L3	CO1
Q4	Find the 3ʳᵈ moment, 3ʳᵈ central moments for the probability mass function of discrete random variable : $(i)\ P(X) = \begin{cases} \frac{1}{2}, if\ x=1 \\ \frac{1}{3}, if\ x=2 \\ \frac{1}{6}, if\ x=3 \\ 0, otherwise \end{cases}$ $(ii)\ P(X) = \begin{cases} \frac{3}{4}, if\ x=1 \\ \frac{1}{4}, if\ x=2 \\ 0, otherwise \end{cases}$	[8]	L6	CO1

Unit II

Q1	Prove that mean and variance of poisson distribution are equal.	[4]	L3	CO2
Q2	Find Mean and Variance of Binomial Distribution. Ten Coins are thrown simultaneously then find the probability of getting at least 7 heads.	[8]	L5	CO2
Q3	Prove that Poisson distribution as a limiting case of Binomial distribution, when $p \rightarrow 0$, $n \rightarrow \infty$ such that $np = m$ (a finite quality). If a random variable has a Poisson distribution such that $P(1) = P(2)$, Find : (i) Mean of the distribution. - (ii) $P(4)$.	[8]	L5	CO2
Q4	Explain the Normal distribution with properties. Prove that mean and variance for Normal distribution are μ, σ^2 respectively.	[8]	L3	CO2

Subject Name: Analysis & Design of Algorithm

Subject Code: B127372(022)

Max Marks: 40

Min Marks:14

Times: 2 hrs

Note: *All questions are compulsory*

CO 1: Analyze running times of different recursive and non-recursive algorithms using asymptotic analysis.
CO 2: Analyze the time complexity of different sorting algorithms.
CO 3: Apply Greedy methods to solve the Knapsack problem, Huffman Encoding, Minimum Spanning Tree and Single Source Shortest Path Algorithm

Q.No.			Questions	Marks	BL	CO
			UNIT 1			
1	a		Calculate the growth rate of the given equations using substitution method (i) $T(n) = \begin{cases} 1, & \text{when } n=0; \\ T(n-1)+n, & \text{when } n>0 \end{cases}$ (ii) $T(n) = \begin{cases} 1, & \text{when } n=0; \\ 2T(n-1)+1, & \text{when } n>0 \end{cases}$	8	L3	1
	b		Solve the following recurrence equation using Recursive Tree Method (i) $T(n) = 2T\left(\frac{n}{2}\right) + n$	8	L3	1
			UNIT 2			
2	a		Compute the Time complexity of Quick sort Algorithm for best and worst case	8	L3	2
	b		Distinguish between Radix sort and Counting sort with an example	8	L4	2
			UNIT 3			
3	a		Apply Fractional Knapsack method and determine the total profit for the given scenario Profit (P): 10 15 21 8 9 18 14 Weight(w): 1 3 7 4 1 3 2 W (Weight of the knapsack): 15	8	L3	3

Department of Computer Science & Engineering

Class Test – I Session- July – Dec, 2023 Month-October

Sem- CSE 3rd (AI) Subject- Computer Organization and Architecture Code- BJ27373(022)

Time Allowed:2 hrs Max Marks: 40

Note: - Question No. 1 is compulsory, attempt any two questions from Question No. 2, 3 and 4.

CO1: Understand basics of Computer Organization, concepts of program as sequences and operation of computers.

CO2: Understand the basic processing unit, embedded and other large computing systems.

CO3: Understand the basic of Arithmetic operations performed by the computer and its hardware implementations.

Q.N.	Questions	Marks	Levels of Bloom's Taxonomy	COs
Unit I				
Q1	Explain CPU behavioer.	[2]	L_5	CO1
Q2	Explain Microprocessor 680X0 and its instruction set.	[6]	L_3	CO1
Q3	Evaluate the arithmetic statement (A+B)*(C+D) using various address instructions.	[6]	L_4	CO1
Q4	Explain CPU with the general register organization.	[6]	L_5	CO1
Unit II				
Q1	Define RISC machine.	[2]	L_4	CO1, CO2
Q2	Explain GCD processor with the help of control unit architecture.	[6]	L_4	CO2
Q3	What is Hardwired and Micro programmed control unit.	[6]	L_5	CO2
Q4	Explain the difference between combination ALU and sequential ALU.	[6]	L_5	CO2
Unit III				
Q1	Convert $(2314)_{10}$ and $(1123)_{10}$ decimal to binary.	[2]	L_4	CO2, CO3
Q2	Draw and Explain Hardware implementation of addition and subtraction of signed magnitude numbers.	[6]	L_4	CO3
Q3	Explain Addition subtraction of signed 2'S complement representation.	[6]	L_5	CO3
Q4	Draw and Explain the flow chart for signed magnitude numbers Addition and subtraction.	[6]	L_4	CO3
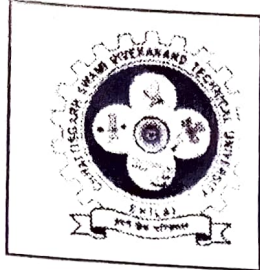
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Department of Computer Science & Engineering

Class Test – I   Session- Sep – oct, 2024   Month-Sep

Sem- CSE 3rd(AI)/DS

Subject Name – Discrete Structure   **Subject- Code-B127374(022)**

Max Marks: 40   Min Marks:14   Time Allowed:2 hrs

Note: -Part A is compulsory, attempt any questions from B,C and D.

CO1: Solve engineering related problems based on concepts of group theory

C02: Use basic concepts of Ring and Field to solve real life related problems.

Q.N.	Questions	Marks	Levels of Bloom's Taxonomy	COs
	Unit I			
Q1	Prove that every cyclic group is abelian. Show by an example that the converse may not be true always.	[4]	L4	CO1
Q2	Show that the set $\{\cos\theta + i\sin\theta : \theta \in Q\}$ forms an infinite abelian group with respect to usual multiplication.	[8]	L6	CO1
Q3	Prove that the intersection of two normal subgroups is again a normal subgroup. Also give one example.	[8]	L3	CO1
Q4	Show that the collection of all the even permutation of S_n, forms a group with respect to permutation multiplication. Is this abelian?	[8]	L6	CO1
	Unit II			
Q1	Using mathematical induction method prove that: $7^{2n} + 16n - 1$ is divisible by 64.	[4]	L3	CO2
Q2	Define homomorphism of groups. Prove that the kernel of homomorphism is a normal subgroup of G.	[8]	L5	CO2
Q3	Let E denote the set of all even integers. Show that the set $\{E, +, *\}$ is a commutative ring with unity, where $a * b = \frac{a.b}{2}$ and $+$ is the usual addition.	[8]	L5	CO2
Q4	Prove that every finite integral domain is a field. Give an example of a infinite integral domain which is not a field.	[8]	L3	CO2

Chhattisgarh Swami Vivekanand Technical University
University Teaching Department
Class Test-1 (*July-December 2024*)
B. Tech(H)-3rd Semester
Branch: Artificial Intelligence/ Data Science

Subject Name: Database Management System
Max Marks: 40
Min Marks:14
Subject Code: B127375(022)
Times: 2 hrs

Note: Part A is compulsory.

Attempt any two questions from Part B, Part C, and Part D.

CO 1: Understand fundamental database concepts, DBMS architecture, and the role of entities, relationships, and constraints.

CO 2: Apply relational algebra and calculus, and enforce integrity constraints in relational schema design.

CO 3: Evaluate SQL for database creation, modification, and querying with advanced operations.

CO 4: Creating database design, applying normalization, and storage techniques like indexing and file organization.

CO 5: Apply transaction management, concurrency control, and database recovery techniques.

Q.No.		Questions	Marks	BL	CO
		UNIT 1			
	A	Define the following i) Instance ii) Schema	4	L1	1
	B	Explain different types of Keys.	8	L3	1
1	C	Analyze the difference between data abstraction and data independence in a database system.	8	L4	1
	D	Compare and contrast the hierarchical, network, and relational data models	8	L4	1
		UNIT 2			
2	A	Explain the differences between the following with an examples (i) Single valued and multiple valued attributes. (ii) Derived and non-derived attributes.	4	L2	2
	B	Explain the concept of relational algebra? Discuss about different operators used in algebra.	8	L3	2
	C	Consider the following relations to construct queries using relational algebra, Relational calculus and Domain relational calculus Person (name, street, city) Owns (name, reg_no, model, year) Accident (date, reg_no) Answer the following using Relational Algebra. (i) Find the names of persons who are not involved in any accident. (ii) Find the names and street of persons who own a maruti car. (iii) Find the registration numbers of the cars manufactured in the year 2024.	8	L6	2
	D	Analyze the difference between entity integrity and referential integrity in DBMS	8	L4	2