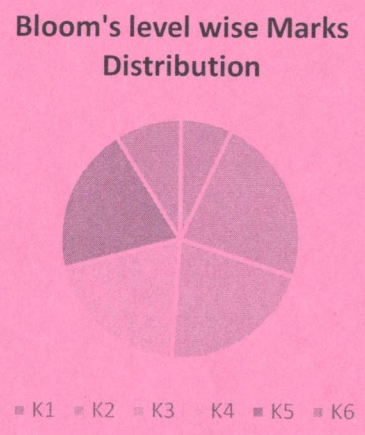
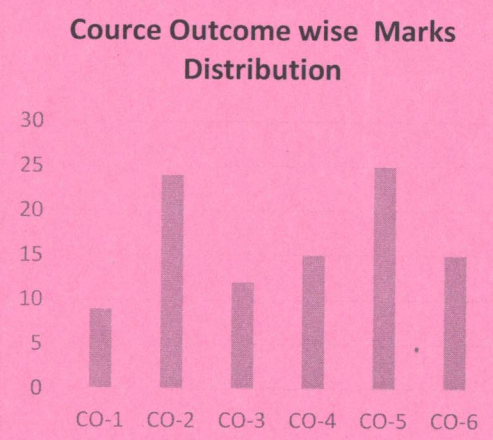
CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Describe the various application layer protocols used by TCP/IP reference model. (PO1,3,4)
	CO2	Differentiate between connection oriented and connection less services of transport layer. (PO1,3,4)
	CO3	Solve problems of routing using various routing protocols and algorithms. (PO1,3,4)
	CO4	Illustrate access control protocols of data link layer. (PO1,3,4)
	CO5	Identify issues related to wireless networks, cellular networks and mobility in Internet. (PO1,3,4)

GRAPHICAL REPRESENTATION





JGI	**ARKA JAIN University** Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	**END SEM EXAMINATION** **School of Engineering & IT**
Branch	**Computer Science & Engineering**	**Program**	**M.Tech**
Subject Name	**Advances in Computer Networks**	**Semester**	**I**
		Year	**March,2025**
Time: 3 Hour Max. Marks : 70	• Start writing from 2nd page onwards; **don't Write on the 1st Page Backside** • **Answer all Questions of Section A (Compulsory)** • **Answer Any Four out of Six of Section B** • **Answer Any Three out of Five of Section C** • **Possession of Mobile Phone** or any kind of **Written Material, Arguments with the Invigilator or Discussion with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Paper(s)**.		
Knowledge Level (KL)	**K1** : Remembering	**K3** : Applying	**K5** : Evaluating
	K2 : Understanding	**K4** : Analysing	**K6** : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	Define HTTP and explain its primary purpose in web communication.	2	CO1	K1, K2
ii	What is the purpose of the Internet Protocol (IP) in networking?	2	CO1	K1, K2
iii	Define Cyclic Redundancy Check (CRC).	2	CO4	K1
iv	What is the function of the TCP three-way handshake?	2	CO2	K2
v	What is the primary purpose of the 802.11 architecture in wireless LANs?	2	CO5	K1, K2
vi	List two key features of an Ethernet frame.	2	CO4	K1
vii	List any two key differences between IPv4 and IPv6.	2	CO1	K1, K2
viii	Explain the role of cookies in user-server interaction.	2	CO1	K2
ix	What is a handoff in GSM networks	2	CO5	K1, K2
x	What is the role of a socket in transport layer communication?	2	CO1	K2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Describe how mobility management works in cellular networks.	05	CO5	K2, K3
3	Explain the format of an IP datagram, highlighting its key fields and their functions.	05	CO1	K2, K4
4	Explain the Ethernet frame structure and its key components	05	CO4	K2, K3
5	Explain TCP congestion control in simple terms with an example.	05	CO2	K3
6	Describe the structure and components of an HTTP request and response message.	05	CO1	K2, K3
7	What is Multiprotocol Label Switching (MPLS), and how does it enhance network efficiency?	05	CO3	K3, K4

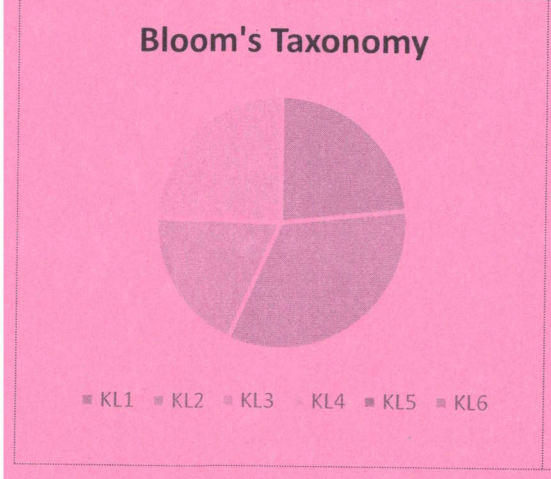
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

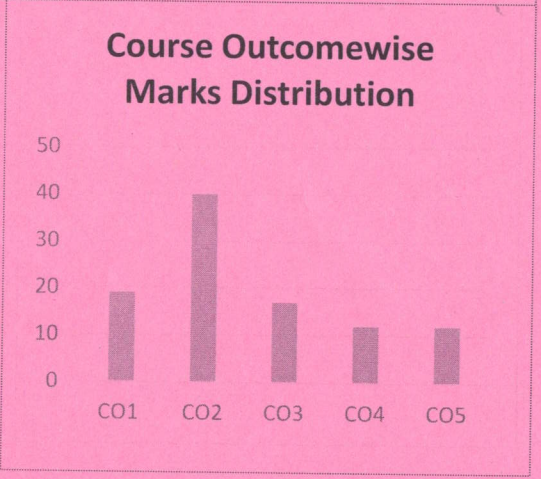
Q. No.	QUESTIONS	Marks	COs	KL
8	Discuss the working and advantages of Peer-to-Peer (P2P) file distribution, including the role of Distributed Hash Tables (DHTs)	10	CO1	K4, K5
9	Differentiate TCP and UDP based on reliability, connection orientation, and use cases. Describe how TCP ensures reliable data transfer.	10	CO2	K2, K4
10	What is the purpose of a routing algorithm in a network? Describe Link-State (LS) routing algorithms in terms of it's working principle.	10	CO3	K3, K4
11	Compare Channel Partitioning Protocols and Random Access Protocols, providing examples of each.	10	CO4	K4, K5
12	What is the role of Mobile IP in managing mobility? Discuss the process of routing a call to a mobile user in GSM.	10	C05	K4

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Understand the basics of block chain technology
	CO2	Analyze the different technologies of block chain
	CO3	Describe the abstract models of block chain
	CO4	Apply the smart contract languages and verification languages
	CO5	Develop the block chain technology on different applications

GRAPHICAL REPRESENTATION





ARKA JAIN University Jharkhand — NAAC GRADE A

END SEM EXAMINATION
School of Engineering & IT

Branch	Computer Science & Engineering	Program	M. Tech
Subject Name	Block Chain Technology	Semester	I
		Year	March,2025

Time: 3 Hour Max. Marks : 70

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Four out of Six of Section B**
- **Answer Any Three out of Five of Section C**
- **Possession of Mobile Phone** or any kind of **Written Material, Arguments with the Invigilator or Discussion with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Paper(s)**.

Knowledge Level (KL)			
	K1 : Remembering	**K3** : Applying	**K5** : Evaluating
	K2 : Understanding	**K4** : Analysing	**K6** : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	How are blockchain networks categorized? Differentiate between permissionless and permissioned blockchains	2	CO1	K2
ii	Define smart contracts.	2	CO2	K1
iii	What are consensus models?	2	CO4	K2
iv	What is Bitcoin?	2	CO2	K1
v	How does blockchain ensure decentralization and security in a distributed system?	2	CO5	K2
vi	Explain the concept of a decentralized ledger in blockchain.	2	CO2	K3
vii	Write down the reason for the popularity of digital token.	2	CO2	K2
viii	What is Hyper Ledger?	2	CO1	K1
ix	Compare Proof of Work (PoW) and Proof of Stake (PoS)	2	CO3	K4
x	Write down the importance of Digital Signature.	2	CO2	K2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	Cos	KL
2	What are the key features of blockchain? Explain in details.	05	CO1	K1
3	Describe the purpose and functionality of MetaMask.	05	CO2	K2
4	Describe asymmetric-key cryptography and its role in blockchain transactions.	05	CO3	K3
5	Describe how Bitcoin achieves decentralization.	05	CO5	K4
6	What is Ethereum, and how does it differ from Bitcoin	05	CO5	K4
7	How is block chain used for Seafood supply chain traceability?	05	CO2	K2

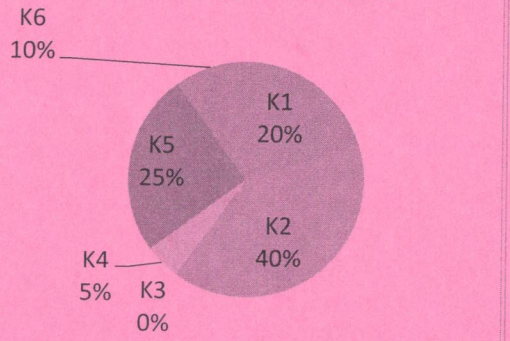
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

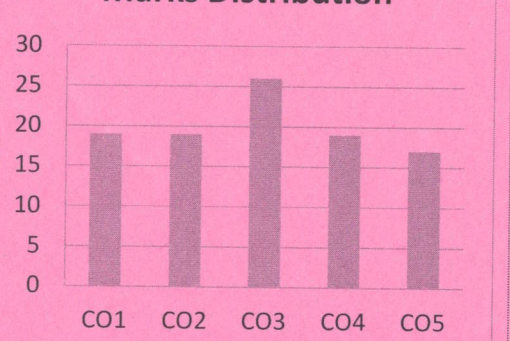
Q. No.	QUESTIONS	Marks	COs	KL
8	Discuss the role of blockchain in education, MOOCs, and smart contract literacy.	10	CO2	K4
9	Explain the concept of a decentralized application (DApp) and its components.	10	CO4	K3
10	What are the key components of Hyperledger Iroha?	10	CO1	K1
11	What are cryptographic hash functions? Explain Hash Pointers and Data Structures with examples.	10	CO2	K2
12	Describe the CoCo Framework and its benefits in blockchain technology.	10	CO3	K2

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Understand different database model and the overview of relation data base model
	CO2	Understand the different query languages and systems.
	CO3	Analyse the concepts of indexing and hashing
	CO4	Apply the query processing and optimization to databases
	CO5	Analyse the processing the queries in distributed and parallel databases

GRAPHICAL REPRESENTATION





ARKA JAIN University, Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY

END SEM EXAMINATION
School of Engineering & IT

Branch	Computer Science & Engineering	Program	M.Tech
Subject Name	Data Base Modelling and Design	Semester	I
		Year	March,2025

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; don't Write on the 1st Page Backside
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Four out of Six of Section B**
- **Answer Any Three out of Five of Section C**
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Knowledge Level (KL)	**K1** : Remembering	**K3** : Applying	**K5** : Evaluating
	K2 : Understanding	**K4** : Analysing	**K6** : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	In relational algebra, what does the UNION operation do?	2	CO1	K1
ii	How does Neo4J store relationships between data nodes?	2	CO3	K2
iii	What is an index in a database?	2	CO3	K1
iv	What are the main features of the Object-Oriented Data Model?	2	CO2	K2
v	What is the general response time law?	2	CO5	K1
vi	What are two common mistakes in experimental design?	2	CO2	K1
vii	Define an M/M/1 queue.	2	CO4	K1
viii	List two key components of an RTE.	2	CO4	K2
ix	What is the purpose of Specialization in the EER model?	2	CO1	K2
x	How does dynamic hashing differ from static hashing?	2	CO3	K2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Explain the key components of the Entity-Relationship (ER) model and their significance in database design.	05	CO1	K1
3	A system has an average of 10 customers in a queue, and the arrival rate is 5 customers per minute. Use Little's Law to determine the average time a customer spends in the system.	05	CO5	K5
4	Derive and explain Little's Law with a suitable example.	05	CO4	K4
5	What is Neo4J? Explain the difference between SQL and NoSQL databases with examples.	05	CO3	K1
6	How does indexing work in Neo4J?	05	CO3	K2
7	Describe the Graph Data Model. How is it used to represent relationships in data and give an example of its application?	05	CO2	K2

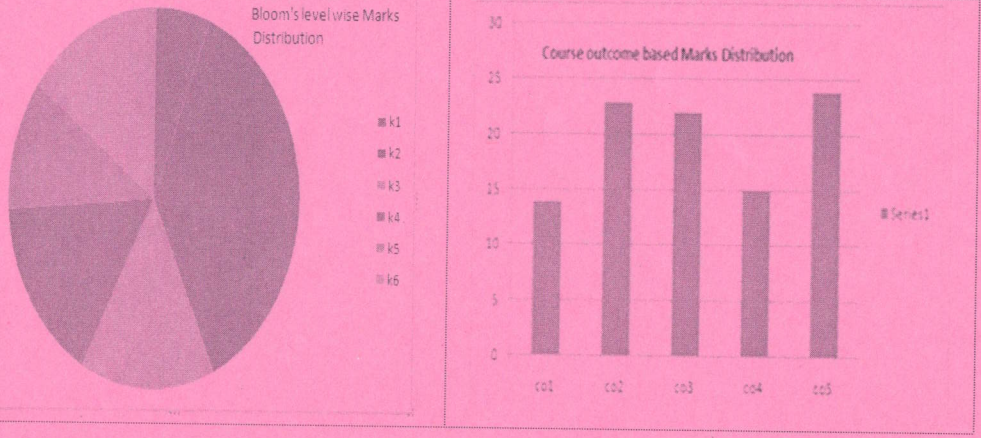
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	A Remote-Terminal Emulation system models 100 concurrent users executing 5 transactions per second on average. If each transaction requires 0.2 seconds of processing time, calculate the system's utilization. Is the system overloaded?	10	CO4	K5
9	What is a bitmap index? Discuss the components of a Remote-Terminal Emulation (RTE) system.	10	CO3	K2
10	How does a B+-Tree differ from a B-Tree? Provide a detailed explanation of querying a relational database using relational algebra. Include examples of basic operations like selection, projection, and join.	10	CO2	K2
11	Design a sample EER schema for a UNIVERSITY database. Include entities like Students, Professors, Courses, and Departments, and show the relationships.	10	CO1	K6
12	A system consists of 3 service stations with the following service demands: CPU: 30 ms Disk: 50 ms Network: 20 ms The system processes 100 requests per second. Determine the bottleneck resource using Bottleneck Analysis.	10	CO5	K5

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Devise recurrence relations and amortized cost of various operations..
	CO2	Illustrate graph algorithms such as Bellman-Ford, Shortest path, bipartite matching, B-trees, Red-Black trees and hashing techniques..
	CO3	Identify the methods for solving modular linear equations, Chinese remainder theorem and RSA cryptosystem, types of heaps such as Binomial and Fibonacci heaps.
	CO4	Assess the string matching algorithms such as Boyer-Moore and Knuth-Morris-Pratt algorithm.
	CO5	Compose mathematical models, objective functions and constraints to solve algoritshmic puzzles

GRAFICAL REPRESENTATION



ARKA JAIN University
Jharkhand
NAAC GRADE A

END SEM EXAMINATION
School of Engineering & IT

Branch	**Computer Science & Engineering**	**Program**	**M.Tech**
Subject Name	**Advanced Algorithms**	**Semester**	**I**
		Year	**March,2025**

Time: 3 Hour
Max. Marks : 70

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
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- **Answer Any Three out of Five of Section C**
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Knowledge Level (KL)	**K1** : Remembering	**K3** : Applying	**K5** : Evaluating
	K2 : Understanding	**K4** : Analysing	**K6** : Creating

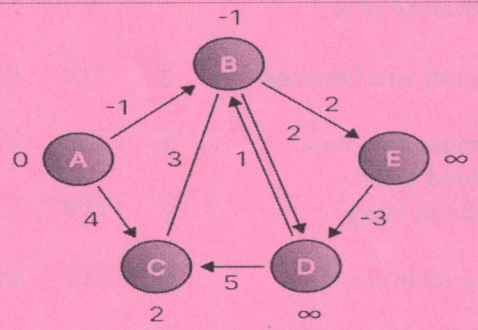
Section A (Each question Carry 02 Marks from Q1-i to x) – 20 Marks

Q. N 1	QUESTIONS	Marks	COs	KL	PO
i	Determine the worst case time complexity of a quick sort algorithm on an input array of N numbers?	2	CO1	K1	PO 2
ii	What is Single Source Shortest path in a Directed Acyclic Graph?	2	CO2	K4	PO 3
iii	Which collision resolution technique involves maintaining a linked list of collided keys?	2	CO2	K1	PO1
iv	What is the time complexity of Build Heap operation?	2	CO3	K2	PO2
v	Write Master method for solving recurrence.	2	CO2	K1	PO1
vi	Determine the required number of colors used by a proper coloring graph with n vertices.	2	CO2	K4	PO1
vii	What is a Rabin and Karp Algorithm used for? Explain how it is used.	2	CO1	K5	PO2
viii	Define bionomial heap.	2	CO5	K5	PO2
ix	Find the O-notation for the following function. $f(n)=4n^3+2n+3$	2	CO1	K5	PO2
x	Explain the term Worst case time complexity with suitable example.	2	CO5	K3	PO2

Section B (Answer any FOUR out of SIX) - 20 Marks
(Each question 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Define various asymptotic notations with suitable example.	5	CO3	K4	PO2
3	Write a Recursive Function to determine the factorial of a number.	5	CO1	K3	PO2
4	Write algorithm for solving the problem of sorting 5 with max of 7 comparison.	5	CO5	K6	PO2
5	What is a string? Explain the concept of string matching algorithm.	5	CO4	K3	PO2
6	What do you mean by Dynamic programming (DP) ? What is the difference between DP and Divide-conquer algorithm ?	5	CO2	K2	PO1
7	Design and analyze of an algorithm for graph colouring problem using backtracking technique.	5	CO1	K2	PO4

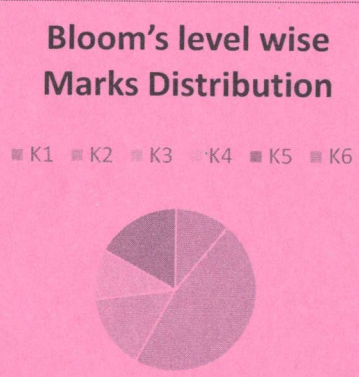
Section C (Answer any THREE out of FIVE) - 30 Marks
(Each question Carry 10 Marks)

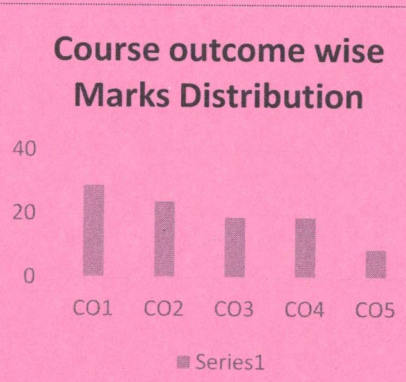
Q. No.	QUESTIONS	Marks	COs	KL	PO
8	 Determine the shortest path using BellMan Ford Algorithm.	10	CO2	K3	PO2
9	Explain Red and Black tree with example. Show the red-black trees that result after recursively inserting the keys 41,38,31,12,19,8 into an initially empty Red-Black tree	10	CO3	K2	PO3
10	What is cryptosystem? Write a short note RSA cryptosystem.	10	CO3	K2	PO3
11	Write the backtracking algorithm for solving N Queens problem. Show the state space tree for 4 Queens problem.	10	CO5	K6	PO3
12	What is chained hashing? Discuss its pros and cons. Construct the hash table to insert the keys: 7, 24, 18, 52, 36, 54, 11, 23 in a chained hash table of 9 memory locations. Use h(k) = k mod m.	10	CO4	K4	PO4

CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	The students will be able to apply interpolation methods and find approximate solution of algebraic and transcendental equations.
	CO2	The students will be able to compute several statistical measures and analyze any given bivariate data.
	CO3	The students will be able to deal with the treatment of random variables and their probability distributions.
	CO4	The students will be able to apply Statistical techniques of the Analysis of Variance and the Designs of Experiments.
	CO5	The students will be able to have idea of Queuing system and Queuing Models.

GRAPHICAL REPRESENTATION





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ARKA JAIN University Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY

END SEM EXAMINATION
School of Engineering & IT

Branch	ME / CSE / EVT	**Program**	M. Tech
Subject Name	**Advanced Engineering Mathematics and Experimental Methods**	**Semester**	I
		Year	March, 2025

Time: 3 Hour Max. Marks : 70

- Start writing from 2nd page onwards; **don't Write on the 1st Page Backside**
- **Answer all Questions of Section A (Compulsory)**
- **Answer Any Four out of Six of Section B**
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Knowledge Level (KL)	**K1** : Remembering	**K3** : Applying	**K5** : Evaluating
	K2 : Understanding	**K4** : Analysing	**K6** : Creating

Section A (Each question Carry 02 Marks from Q1- i to x – 20 Marks)

Q. N 1	QUESTIONS	Marks	COs	KL
i	What do you mean by interpolation?	2	CO1	K1
ii	Write down formula used for finding roots under Regula Falsi mehtod.	2	CO1	K1
iii	What is the effect of change of origin and change of scale on correlation coefficient?	2	CO2	K2
iv	Write down the equations of two regression lines.	2	CO2	K2
v	What do you mean by probability function of a random variable?	2	CO3	K1
vi	The mean of a binomial variate with parameters n and p are 4 and 2 respectively. Evaluate p	2	CO3	K5
vii	What is meant by two-way classification of Analysis of Variance?	2	CO4	K2
viii	Write down any two advantages of R.B.D. over C.R.D.	2	CO4	K2
ix	Explain reneging.	2	CO5	K2
x	Explain FCFS.	2	CO5	K2

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	The following data is given, prepare difference table: Arguments: 4, 7, 10, 13, 16 Entries: 5, 12, 20, 30, 45	05	CO1	K3
3	What is correlation? How it is measured? Mention the limits of correlation coefficient.	05	CO2	K2
4	Find rank correlation coefficient for the following data: Rank in honesty: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 Rank in intellegency: 3, 4, 1, 8, 2, 6, 5, 7, 10, 9	05	CO2	K5
5	Define binomial random variable. What are its parameters? Also write expressions for its mean and variance.	05	CO3	K1
6	Explain the Lay-out of a Randomized Block Design.	05	CO4	K2
7	Explain any one Queuing Model.	05	CO5	K2

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Estimate f(8) by applying suitable interpolation formula for the data given below: x: 6, 7, 9, 11 f(x): 12, 25, 40, 54	10	CO1	K5
9	Apply Bisection method to find the approximate root of the equation $x2 + x - 3 = 0$ up to 4th approximation.	10	CO1	K3
10	Find the regression line of Y on X for the following bivariate data: X: 8, 10, 11, 13, 15, 16, 18, 20, 22, 23 Y: 10, 11, 10, 12, 14, 16, 17, 18, 18, 20	10	CO2	K4
11	Define Random variable. Distinguish between discrete and continuous random variable. Also explain probability function of a random variable.	10	CO3	K2
12	Write an essay on Analysis of Variance.	10	CO4	K2