

**SEMESTER II  
ALGORITHMS  
THEORY**

### 1. Course Description

**Programme:** M.Sc. Computer Science (AI & ML)  
**Course Code:** P24/CAI/DSC/202  
**Course Type:** DSC  
**No. of credits:** 3

**Max. Hours:** 45  
**Hours per week:** 3  
**Max. Marks:** 100

### 2. Course Objectives:

1. To understand the functionality of divide-and-conquer, dynamic programming and greedy algorithms.
2. To apply analysis of algorithms to model problems.

### 3. Course Outcomes

On completion of the course the student will be able to:

- CO1: *Illustrate* and *explain*:** Analyze and compare different algorithm (Cognitive level-1,2,3)  
**CO2: *Apply*** the concepts of dynamic programming and greedy approach. (Cognitive level-3)  
**CO3: *Choose* and *Design*** performance of different graph algorithms. (Cognitive level-5,6)

### 4. Course Content

#### **MODULE 1: REVIEW OF FUNDAMENTAL ALGORITHMS & DATA STRUCTURES (15 Hrs.)**

Introduction – Definition of an Algorithm, Algorithm Specification, Growth of Functions and Dictionaries.

Elementary Data Structures – Stacks and Queues, Priority Queues.

Divide-and-Conquer –The master method for solving recurrences, Stassen’s algorithm for Matrix Multiplication, Merge Sort, Quick Sort – Description and performance of Quick Sort and Hash Tables.

Greedy Algorithms – Elements of greedy strategy, Activity-selection problem and Huffman codes as primary examples.

#### **MODULE 2: DYNAMIC PROGRAMMING AND GREEDY ALGORITHMS (15 Hrs.)**

Dynamic Programming – Elements of Dynamic Programming and Optimal Binary Search Trees as primary examples.

Binary Search Trees – Building, Querying, Inserting and Deleting in a Binary Search Tree. Red-Black Trees, B-Trees and Heap sort

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**MODULE 3: GRAPHS****(15 Hrs.)**

Review of Fundamental Graph Algorithms, Minimum Spanning Trees – Kruskal and Prim, Single-Source Shortest Paths – Bellman-Ford and Dijkstra’s algorithm. All-Pairs Shortest Paths – Floyd-Warshall algorithm. A brief Introduction to P and NP problems.

**5. References:**

1. Cormen, T. (2009). Introduction to algorithms. Cambridge, Mass: MIT Press
2. Horowitz, E., Sahni, S. & Rajasekaran, S. (2005). Computer algorithms. Norwood Mass: Books24x7.com
3. Sedgewick, R. & Wayne, K. (2011). Algorithms. Upper Saddle River, NJ: Addison-Wesley.
4. Cormen, T. (2009). Introduction to algorithms. Cambridge, Mass: MIT Press

**6.Syllabus Focus**

a) Relevance to Local, Regional, National and Global Development Needs

<b>Local /Regional/National /Global Development Needs</b>	<b>Relevance</b>
Global Development	Overall, the analysis of algorithms is essential for driving innovation, improving efficiency, ensuring accessibility, and addressing global challenges in various domains, making it a fundamental aspect of global development efforts.



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## b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	developing proficiency in algorithm analysis requires a combination of theoretical knowledge, practical problem-solving skills, programming proficiency, and a willingness to learn and adapt to new challenges.
EMP	Modules 3	By analyzing these trends depicted in the employability graph for analysis of algorithms, individuals can make informed decisions about their career paths, identify areas for skill development, and tailor their job search strategies to align with the demands of the job market.

## 7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Seminar Presentation	Participative Learning
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative Learning

## 8. Course Assessment Plan

## a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

COs	Continuous Internal Assessments - CIA (40%)	End Semester Examination - (60%)
CO 1	CIA-1	End Semester examination
CO 2	CIA-1	
C03	CIA-2 Presentation	



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**b) Model Question Paper- End Semester Exam**

**ALGORITHMS  
MODEL QUESTION PAPER  
THEORY**

**Course Code: P24/CAI/DSC/202**  
**Credits: 3**

**Max Marks: 60**  
**Time: 2 ½ Hrs.**

**SECTION – A**


**I. Answer for the following:****3 x 12= 36**

1. Explain Strassen's algorithm for matrix multiplication.  
OR
2. Describe Quick Sort algorithm illustrating with an example.
3. Explain Binary Search Tree in detail along with Tree traversals.  
OR
4. Describe B-Trees and discuss the procedure to delete a key from it.
5. Describe Floyd – Warshall algorithm for all pair shortest paths.  
OR
6. Explain Dijkstra's algorithm for solving Single-Source Shortest Path.

**SECTION – B**

**II Answer any Four:****4 x 6 = 24**

7. Write a short note on Stacks and Queues.
8. Explain Hash tables and describe how collisions can be resolved.
9. Explain Huffman Codes.
10. Discuss about elements of dynamic programming in brief.
11. Explain Breadth First Search.
12. Describe Kruskal's algorithm to find the minimum cost spanning tree.

  
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## c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
I	15	1	2	12	2	12
II	15	2	2	12	2	6
III	15	3	2	12	2	6

NOTE: From

Section-A any 3 questions can be answered (INTERNAL CHOICE).

Section-B any 4 questions can be answered. (EXTERNAL CHOICE)

## 8. CO - PO Mapping:

CO	PO	Cognitive Level	Class room sessions(Hrs.)
1	1	2,3	15
2	2	5	15
3	2	6	15

*sgl*

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**SEMESTER - II  
ALGORITHMS  
PRACTICAL**

**1. Course Description**

**Programme: M.Sc. Computer.Science(AI & ML)**  
**Course Code: P24/CAI/DSC/202/P**  
**Course Type: DSC**  
**No. of credit: 2**

**Max. Hours: 60**  
**Hours per week:4**  
**Max. Marks: 50**

**2. Course Objectives**

To understand complex algorithm concepts and to develop programs to illustrate the applicability to solve real time problems.

**3. Course Outcomes**

CO1: To analyze and compare different algorithms, graphs and trees.  
 CO2: To apply divide and conquer to solve complex problems.

**4. Practical Sessions**

1. Program to demonstrate Merge Sort.
2. Program to demonstrate Quick Sort.
3. Program to demonstrate Heap Sort.
4. Program to create a Binary Search Tree and perform in order traversal.
5. Program to create a Binary Search Tree and perform preorder traversal.
6. Program to create a Binary Search Tree and perform postorder traversal.
7. Program to construct and display a simple Graph.
8. Program to implement Breadth-first Search on a Graph.
9. Program to implement Depth-first Search on a Graph.
10. Program to implement Topological Sort on a Directed Graph.
11. Program to implement Dijkstra's algorithm to find a single source shortest path on a Directed Graph.
12. Program to implement Bellman-Ford algorithm to find a single source shortest path on a Directed Graph.
13. Program to implement a Hash Table.
14. Program to demonstrate Huffman codes.
15. Program to illustrate Activity Selection Problem.



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**ALGORITHMS  
MODEL QUESTION PAPER  
PRACTICAL**




**Course code: P24/CAI/DSC/202/P**

**Max. Time: 2 hrs.**

**Max. Marks: 50**

Answer any ONE from the following

1. Program to implement Dijkstra's algorithm to find a single source shortest path on a Directed Graph.
2. Program to implement Bellman-Ford algorithm to find a single source shortest path on a Directed Graph
3. Program to implement a Hash Table.
4. Write a Program to implement Topological Sort on a Directed Graph.
5. Write a Program to illustrate Activity Selection Problem.

Prepared by	Checked & verified by	Approved by
 <b>Ms. Shobana</b>  <b>Teaching Faculty</b>	 <b>Ms. D. Sowjanya</b>  <b>Head of the Department</b>	 <b>Dr. Uma Joseph</b>  <b>Principal</b>



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**SEMESTER -II**  
**INFORMATION SECURITY**  
**THEORY**

**1. Course Description**

**Programme:** M.Sc. Computer Science (AI & ML)  
**Course Code:** P24/CAI/DSC/203  
**Course Type:** DISCIPLINE SPECIFIC CORE  
**No. of credits:** 3

**Max. Hours:** 45  
**Hours per week:** 3  
**Max. Marks:** 100

**2. Course Objectives**

- Learn and understand fundamentals of cryptography, network security threats, security services, countermeasures, vulnerability, analysis of network security and its application to network security.
- Acquire & Identify background on hash functions; authentication; firewalls; intrusion detection techniques.
- Apply methods for authentication, access control, intrusion detection and prevention.

**3. Course Outcomes**

On completion of the course the student will be able to:

CO1: *Illustrate* and *explain* basic computer concepts of the risks faced by computer systems and networks and analyse security problems. (Cognitive levels – 2)

CO2: *Apply* security mechanisms to protect computer systems and networks (Cognitive level – 3,4)

CO3: *Choose* and *Design* cryptography algorithms and protocols to achieve computer security (Cognitive levels – 5,6)



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#### 4. Course Content

##### **MODULE I: INTRODUCTION TO INFORMATION SECURITY (15 Hrs.)**

Introduction to Information Security: Attacks, Vulnerability, Security Goals, Security Services and mechanisms.

Conventional Cryptographic Techniques: Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher.

##### **MODULE II: CRYPTOGRAPHIC TECHNIQUES & AUTHENTICATION (15 Hrs.)**

Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms.

Authentication and Digital Signatures- Use of Cryptography for authentication, Secure Hash function.

Program Security: Non malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of-use Errors, Viruses, Man-in-the-middle attacks.

##### **MODULE III: SECURITY AND FIREWALLS (15 Hrs.)**

Security in Networks: Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Firewalls – Design and Types of Firewalls, Personal Firewalls.

#### 5. References

1. Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education, 2015.
2. Cryptography And Network Security Principles and Practice, Fifth Edition, William Stallings, Copyright @2011, 2006 Pearson Education, Inc
3. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall..
4. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall.



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## 6. Syllabus Focus

### a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global Development	Information Security Information security is essential for ensuring that critical business operations can continue in the event of a security breach or cyber-attack. It safeguards all types of data against theft and loss. Sensitive data, protected health information (PHI) and is widely employed in everything from system software to game development.

### b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	Security protocols to help secure an organisation's data. To protect organizations from vulnerabilities and attacks.
EMP	Modules 3	Applying skills in security, and implementing code. Protecting the organization from network threats.



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**7. Pedagogy**

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative	Seminars
2.	Experimental	Quiz, Group Discussion
3.	Problem solving	Troubleshoot (debug) code

**8. Course Assessment Plan****a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination**

CO	Continuous Internal Assessments CIA -40%	End Semester Examination-60%
CO1	CIA 1 – Written Exam	Written Exam
CO2	CIA 2 – Assignment	
CO3	CIA 2 – Lab	



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**b) Model Question Paper- End Semester Exam****INFORMATION SECURITY****MODEL QUESTION PAPER  
THEORY****Course Code: P24/CAI/DSC/203****Credits: 3****Max Marks: 60****Time: 2 ½ Hrs.****I: Answer any Three****3 x 12 = 36**

1. What Discuss about various Security attacks in detail.

OR

2. List the various substitution techniques. Explain any one technique with an example.

3. What is DES and explain the procedure of encryption in DES.

OR

4. Explain the Time-of-check to Time-of- use Errors of two numbers.

5. Explain Encryption in detail.

OR

6. Define a firewall and describe characteristics, types of firewalls in detail.

**II. Answer any Four:****4 x 6 = 24**

7. Explain Vulnerability.

8. Explain the Stream Cipher technique.

9. Write a short note on Buffer overflow.

10. Write a short note on secure hash function?

11. Give an account on threat controls.

12. What are threats? Explain different types of threats.

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## c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
I	15	1	2	12	2	12
II	15	2	2	12	2	6
III	15	3	2	12	2	6

NOTE: From

Section-A any 3 questions can be answered (INTERNAL CHOICE).

Section-B any 4 questions can be answered. (EXTERNAL CHOICE)

## 9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	1	2	15
2	2	4,6	15
3	2	3,5	15



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**SEMESTER II****INFORMATION SECURITY  
PRACTICAL****1. Course Description**

**Programme: M.Sc. Computer Science (AI & ML)**  
**Course Code: P24/CAI/DSC/203/P**  
**Course Type: DSC**  
**No. of credits: 2**

**Max. Hours: 60**  
**Hours per week: 4**  
**Max. Marks: 50**

**2. Course Objective**

To understand the concepts of information security in a local area network and the Internet.  
To apply the security algorithms.

**3. Course Outcomes**

**CO1:** Exploring the digital signatures and authentication protocols to find practical solutions to security issues.

**CO2:** Applying To write programs that use cryptography algorithms and protocols to achieve computer security.

**4. Practical Sessions**




1. Implement Caesar Cipher.
2. Implement Affine Cipher.
3. Implement Playfair Cipher with a key entered by the user.
4. Implement polyalphabetic Cipher.
5. Implement AutoKey Cipher.
6. Implement Hill Cipher.
7. Implement Rail fence technique.
8. Implement Simple Columnar Transposition technique.
9. Implement Simple RSA Algorithm with small numbers.
10. Implement Simplified DES




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**MODEL QUESTION PAPER****INFORMATION SECURITY  
PRACTICAL****COURSE CODE: P24/CAI/DSC/203/P****Max.Marks: 50****Exam Duration:2 Hrs.****Answer any one of the following.**

1. Write a program to implement Caesar Cipher.
2. Write a program to implement Playfair Cipher with a key entered by the user.
4. Write a program to implement polyalphabetic Cipher.
5. Write a program to implement AutoKey Cipher.
6. Write a program to implement simplified DES.

Prepared by	Checked & verified by	Approved by
 <b>Ms. B. Jyothi</b> <b>P.G. Coordinator</b>	 <b>Ms. D. Sowjanya</b> <b>Head of the Department</b>	 <b>Dr. Uma Joseph</b> <b>Principal</b>

  
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**SEMESTER II**  
**MACHINE LEARNING**  
**THEORY**

**1. Course Description**

**Programme:** M.Sc. Computer Science (AI & ML)  
**Course Code:** P24/CAI/DSC/204  
**Course Type:** DISCIPLINE SPECIFIC CORE  
**No. of credits:** 3

**Max. Hours: 45**  
**Hours per week: 3**  
**Max. Marks: 100**

**2. Course Objectives**

- To understand the basic theory underlying machine learning and the range of problems that can be handled by machine learning.
- To learn various machine learning techniques.
- To learn evaluation metrics for performance analysis

**3. Course Outcomes**

On completion of the course the student will be able to:

CO1: *Illustrate* and *explain* essential libraries and different supervised algorithms  
(Cognitive levels – 2)

CO2: *Apply* pre-processing techniques and unsupervised algorithms on specified datasets.  
(Cognitive level – 3,4)

CO3: *Choose* and *Design* the model evaluation metrics on applied algorithm  
(Cognitive levels – 5,6)



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#### 4. Course Content

##### **MODULE I: SUPERVISED LEARNING**

**(15 Hrs.)**

Introduction to Machine Learning, Need for Python, scikit-learn, Essential Libraries and Tools, First Application - Classifying Iris Species. Supervised Learning: Classification and Regression, Generalization, Overfitting, and Underfitting, Supervised Machine Learning Algorithms - Some Sample Datasets, k-Nearest Neighbors, Linear Models, Naive Bayes Classifiers, Decision Trees, Ensembles of Decision Trees, Support Vector Machines.

##### **MODULE II: UNSUPERVISED LEARNING AND PREPROCESSING**

**(15 Hrs.)**

Unsupervised Learning: Types and Challenges. Preprocessing and Scaling - Different Kinds of Preprocessing, Applying Data Transformations, Scaling Training and Test Data the Same Way, Effect of Preprocessing on Supervised Learning. Dimensionality Reduction, Feature Extraction, and Manifold Learning - Principal Component Analysis, Non-Negative Matrix Factorization, Manifold Learning with t-SNE, Clustering, k-Means Clustering, Agglomerative Clustering, DBSCAN.

##### **MODULE III: REPRESENTING DATA, MODEL EVALUATION AND ALGORITHM CHAINS**

**(15 Hrs.)**

Categorical Variables, Binning, Discretization, Linear Models, and Trees, Working with Text Data - Types of Data Represented as Strings, Sentiment Analysis of Movie Reviews, Representing Text Data as a Bag of Words.

Cross-Validation, Grid Search, Evaluation Metrics and Scoring, Parameter Selection with Preprocessing, Building Pipelines, Using Pipelines in Grid Searches, General Pipeline Interface, Grid-Searching Preprocessing Steps and Model Parameters, Grid-Searching Which Model to Use.



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## 5. References

1. Introduction to Machine Learning with Python, by Andreas C. Müller & Sarah Guido, O'Reilly Media.
2. Machine Learning by Subramanian, Chandra Mouli, Amit Kumar Das, Saikant
3. Dutt, Pearson Publications, I edition, 2018.
4. Machine Learning by Tom Mitchell, McGraw Hill, 2013.
5. Machine Learning for Absolute Beginners, by Oliver Theobald, 2020.
6. Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 1st Edition , by Aurélien Géron, O'reilly Media.

## 6.Syllabus Focus

### a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global Development	Machine learning has the potential to address a wide range of global development needs by leveraging data-driven insights to inform decision-making and drive positive change across various sectors like agriculture, health, finance etc.

### b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	Applying supervised or unsupervised algorithms on a specific dataset.
EMP	Modules 3	Testing and evaluating metrics of different models.



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**7. Pedagogy**

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative	Seminars
2.	Experimental	Quiz
3.	Problem solving	Identifying, formulating, and addressing challenges using ML techniques.

**8. Course Assessment Plan****a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination**

CO	Continuous Internal Assessments CIA -40%	End Semester Examination-60%
CO1	CIA 1 – Written	Written Exam
CO2	CIA 2 – Assignment	
CO3	CIA 2 – Lab	



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**b) Model Question Paper- End Semester Exam****MACHINE LEARNING****MODEL QUESTION PAPER  
THEORY**

**Course Code: P24/CAI/DSC/204**  
**Credits: 3**

**Max Marks: 60**  
**Time: 2 ½ Hrs.**

**I: Answer the following:****3 x 12 = 36**

1. Define Supervised Learning Algorithm. Explain in detail about k nearest neighbours and naïve Bayes classifiers.

**OR**

2. Describe in detail about Decision Trees.  
3. Define Clustering. Explain the following:  
a. k-Means Clustering.  
b. Agglomerative Clustering.

**OR**

4. Explain in detail about Principal Component Analysis.  
5. Discuss sentiment analysis of movie reviews.

**OR**

6. Describe the importance of Evaluation Metrics and Scoring.

**II: Answer any Four:****4 x 6 = 24**

7. Discuss about Overfitting and Underfitting.  
8. Differentiate between classification and Regression.  
9. Explain in detail about pre-processing and scaling.  
10. Write a short note on DBSCAN.  
11. Discuss binning and discretization.  
12. Write a short note on building pipelines.



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## c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
I	15	1	2	12	2	12
II	15	2	2	12	2	6
III	15	3	2	12	2	6

NOTE: From

Section-A any 3 questions can be answered (INTERNAL CHOICE).

Section-B any 4 questions can be answered. (EXTERNAL CHOICE)

## 9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	1	2	15
2	2	3,4	15
3	2	5,6	15



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**SEMESTER II  
MACHINE LEARNING  
PRACTICAL**

**1. Course Description**

**Programme: M.Sc. Data Science**  
**Course Code: P24/CAI/DSC/204/P**  
**Course Type: DSC**  
**No. of credits: 2**

**Max. Hours: 60**  
**Hours per week: 4**  
**Max. Marks: 50**

**2. Course Objective**

To explore various libraries and packages like NumPy, Matplotlib and Scikit-learn required for machine learning mechanisms.

**3. Course Outcomes**

**CO1:** Exploring Supervised and Un Supervised learning algorithms for data analysis.  
**CO2:** Applying Scikit-learn to represent data and model evaluation.

**4. Practical Sessions**

## 1. Supervised Learning:

- a. k-Nearest Neighbors Classification and Analyzing
- b. Linear Regression.
- c. Building decision trees

## 2. Un Supervised Learning:

- a. Applying Data Transformations
- b. Transformation of data using Principal Component Analysis

## 3. Data Preprocessing:

- a. Applying k-Means Clustering
- b. Applying DBSCAN

## 4. Representing Data:

- a. Applying Binning on Linear models and Trees
  - c. Sentiment analysis of movie reviews
  - d. Representing data as a Bag of Words
5. Model Evaluation and Algorithm Chains:
- a. Implementation of Cross-Validation
  - b. Implementation of Grid Search
  - d. Using Pipelines in Grid Searches



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**MODEL QUESTION PAPER  
MACHINE LEARNING**

**PRACTICAL**




**COURSE CODE: P24/CAI/DSC/204/P**

**Max.Marks: 50**

**Exam Duration: 2 Hrs**

**Answer any one of the following.**

1. k-Nearest Neighbors Classification and Analyzing using Supervised Learning.
2. Transformation of data using Principal Component Analysis using Un Supervised Learning.
3. Applying DBSCAN using Data preprocessing.
4. Represent the data by applying Linear Regression.
5. Implement Cross-Validation using Model Evaluation and Algorithm Chains.

Prepared by	Checked & Verified by	Approved by
 <b>Ms. Khalida Tabassum</b> Teaching Faculty	 <b>Ms. D. Sowjanya</b> Head of the Department	 <b>Dr. Uma Joseph</b> Principal



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## SEMESTER – II

## NETWORKING AND CLOUD COMPUTING

## THEORY

## 1. Course Description

<b>Programme:</b>	<b>M.Sc. Computer. Science (AI &amp; ML)</b>	<b>Max. Hours: 45</b>
<b>Course Code:</b>	<b>P24/CAI/DSC/201</b>	<b>Hours per week: 3</b>
<b>Course Type:</b>	<b>DISCIPLINE SPECIFIC CORE</b>	<b>Max. Marks: 100</b>
<b>No. of credits:</b>	<b>3</b>	

## 2. Course Objectives.

- Ability to design and deploy Cloud Infrastructure.
- Understand cloud security issues and solutions.
- Ability to understand the role of Virtualization Technologies.

## 3. Course Outcomes

On completion of the course the student will be able to:

CO1: **Explain and Compute** To explore the basic taxonomy and terminology of computer networks. (Cognitive levels – 2)

CO2: **Apply** Learn cloud implementation and administration. (Cognitive level – 3,4)

CO3: **Choose and Design** Evaluate the use of cloud for business operations and choose right framework for cloud. (Cognitive levels – 5,6)

## 4. Course Content

**MODULE I: AN INTRODUCTION TO NETWORKS****(15Hrs.)**

Network Communication, types of Networks, Network Protocols, Ethernet, The internet. Transmission Control Protocol/Internet Protocol, Domain Name System-DNS Infrastructure, Protocol, Performance.

Case study: Building Local Area network and TCP/IP.

**MODULE II: CLOUD COMPUTING****(15Hrs.)**

Cloud Computing Overview: Characteristics –challenges, benefits, limitations, Evolution of Cloud Computing, Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a

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Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing. Case Study: SaaS: Salesforce.com, CRM, Online Collaboration Services, IaaS: AWS, OpenStack. PaaS: IBM Bluemix, GAE.

### MODULE III: INTRODUCTION TO VIRTUALIZATION

(15Hrs.)

Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations. Compute Virtualization, Storage Virtualization Network Virtualization, Web Services

Case study: *Virtual* box-based Web Server creation, Images/Snapshots access webpage from 2nd VM on another subnet work 3. EC2 AWS – S3 bucket based static web pages. Use this page as a start page via EC2 web server 4. AWS – Local balancing and auto scaling

#### 4. References:

1. Internet Infrastructure Networking, Web services and Cloud Computing by Richard Fox, Wei Hao, 2017.
2. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach.
3. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008.
4. Cloud computing: principles and paradigms by Buyya, Raj kumar | Broberg, James Goscinski, Andrzej.
5. Cloud computing a practical approach - Anthony T. Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill, New Delhi – 2010.



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## 6.Syllabus Focus

## a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global Development	The global development for computer networks and cloud computing is driving innovation, economic growth, and societal transformation on a global scale, shaping the way we communicate, collaborate, and interact with information in the digital age.

## b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	By focusing on developing these skills, individuals can position themselves for success in careers related to computer networks and cloud computing, whether as network engineers, cloud architects, DevOps engineers, cybersecurity specialists, or cloud consultants.
EMP	Modules 3	Overall, the employability need for computer networking and cloud computing professionals is driven by the increasing reliance on cloud services, the need for robust network infrastructure, growing cybersecurity concerns, and the opportunities presented by digital transformation and innovation. Skilled professionals who possess expertise in these areas are well-positioned to succeed in the rapidly evolving technology landscape



**7. Pedagogy**

S. No	Student Centric Methods	Type / Description of Activity
1.	Participative	Seminars
2.	Experimental	Quiz
3.	Compute	Hand on cloud Service providers

**8. Course Assessment Plan****a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination**

CO	Continuous Internal Assessments CIA -40%	End Semester Examination-60%
CO1	CIA 1 – Written	Written Exam
CO2	CIA 2 – Assignment	
CO3	CIA 2 – Lab	



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## b) Model Question Paper- End Semester Exam

**NETWORKING AND CLOUD COMPUTING  
MODEL QUESTION PAPER  
THEORY**

Course Code: P24/CAI/DSC/201  
Credits: 3

Max Marks: 60  
Time: 2 ½ Hrs.

**SECTION – A****I. Answer the following:****3 x 12= 36**

1. Define Cloud Computing. Explain in detail Layers in cloud architecture.  
OR
2. Explain in detail Transmission Control Protocol/Internet Protocol.
3. Explain in detail about eucalyptus & open stack cloud architecture.  
OR
4. Explain in detail about implementation levels of virtualizations.
5. Explain Cloud deployment model.  
OR
6. Explain various Web services provided in cloud computing.

**SECTION- B****4 x 6 = 24****II. Answer Any Four:**

7. Differentiate B/w full virtualization & para virtualization.
8. Explain in detail about different types of clouds.
9. Discuss about Domain Name System.
10. Write a short note on cloud service providers.
11. Write short notes on Cloud storage for AWS S3 Bucket with private and public access levels
12. Write a short note on SaaS usage and their advantages.



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12. Write a short note on SaaS usage and their advantages.

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
I	15	1	2	12	2	12
II	15	2	2	12	2	6
III	15	3	2	12	2	6

NOTE: From

Section-A any 3 questions can be answered (INTERNAL CHOICE).

Section-B any 4 questions can be answered. (EXTERNAL CHOICE)

9. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs.)
1	1	2	15
2	2	3,4	15
3	2	5,6	15

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## SEMESTER – II

NETWORKING AND CLOUD COMPUTING  
PRACTICAL**1. Course Description**

**Programme: M.Sc. Computer. Science**  
**Course Code: P24/CAI/DSC/201/P**  
**Course Type: DSC**  
**No. of credit: 2**

**Max. Hours: 60**  
**Hours per week:4**  
**Max. Marks: 50**

**2. Course Objectives**

- To introduce the terminology, technology and its applications
- To introduce the Raspberry PI platform, that is widely used in IoT applications

**3. Course Outcomes**

CO1: The completion of the course, the students will be able design some IOT based prototypes.

CO2. Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.

**4. Practical Sessions**

1. Simulators using Packet Tracer – VLAN design, Routing, Subnetting, Gateway configuration.
2. AWS Essentials Introduction to Amazon Web Services, EC2: Compute services, Networking, infrastructure and reliability, Storage and database services.
3. Amazon Elastic Block Store (Amazon EBS).
4. Amazon Simple Storage Service (Amazon S3).
5. Amazon Elastic File System (Amazon EFS).
6. Relational Database Service (Amazon RDS).
7. virtual private cloud (VPC), Identity and Access.
8. Management (IAM) and Security on AWS.



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**NETWORKING AND CLOUD COMPUTING**  
**MODEL QUESTION PAPER**  
**PRACTICAL**

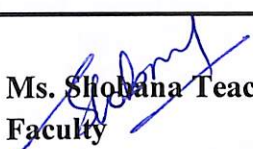

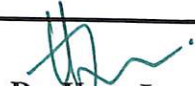
Course code: P24/CAI/DSC/201/P


Max. Time: 2 Hrs.

Max. Marks: 50

Answer any ONE from the following

1. Send a message to communicate in the given network for the given topology.
2. Create Instance for the Public DNS and use S3 bucket to share the data in public.

Prepared by	Checked & Verified by	Approved by
 Ms. Sifohana Teaching Faculty	 Ms. D. Sowjanya Head of the Department	 Dr. Uma Joseph Principal

  
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