

**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**

**Pre-Ph.D Course Work Syllabus::2019**

**Paper: Research Advances in Computer Science & Engineering and Research Methodology**

**(Common to Computer Science and Engineering Streams)**

**UNIT I**

**Introduction:** Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research question-Choice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code. Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing, Plagiarism.

**UNIT II**

**Quantitative Methods for problem solving:** Statistical Modeling and Analysis, Probability Distributions, Inequalities, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Hypothesis Testing. Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis. Linear Equations, Order of Operations, Absolute Value Functions, Polynomials and Quadratic Equations.

**UNIT III**

**Tabular and graphical description of data:** Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables, Relation between frequency distributions and other graphs, preparing data for analysis, Use of statistical software R in research.

**UNIT IV**

**Computer Science Concepts :**

Boolean algebra, Number Systems, Instruction Formats, Addressing Modes, Computer Arithmetic, I-O Interface, Memory Organization: Cache, Main Memory and Secondary Storage. Process Scheduling Concepts and Algorithms, Critical Section Problem and Semaphores, Virtual Memory Management. Network-Introduction to OSI and TCP/IP Reference Model, Network Security-Public-key cryptography and Message Authentication, SHA-1, Secure Hash Function.

**UNIT V**

**Algorithms and Programming Concepts:**

Searching, Sorting, Hashing, Asymptotic Worst Case Time and Space Complexity. Algorithm Design Techniques: Greedy, Dynamic Programming and Divide-and-Conquer, Graph Search, Minimum Spanning Trees, Shortest Paths.

Introduction to Functions and Pointers in C-Programming Language, Features of object oriented programming in Java Programming Language, Data Base-Normalization for Relational Database

**Text Books**

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006
2. Donald H. McBurney, Research Methods, 5<sup>th</sup> Edition, Thomson Learning, ISBN: 81-315-0047-0, 2006.
3. Dr Bharti Motwani, Data Analytics with R, Wiley Publications
4. Computer System Architecture. Morris Mano. Prentice Hall of India.
5. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication
6. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203-1165-5
7. Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi
8. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003
9. C The Complete Reference, Fourth Edition. Herbert Schildt. Mc Graw Hill.
10. Java: The Complete Reference, Herbert Schildt, Ninth Edition, Oracle Press
11. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

*Prof. P.S. Varma*

**Model Question Paper**

**Adikavi Nannaya University: Rajamahendravaram**

**Department of Computer Science & Engineering**

**Pre-Ph.D Examination::2020**

**Paper I: Research Advances in Computer Science & Engineering and Research Methodology**

**Time: 3 hrs**

**Max. Marks: 100**

**Answer all the questions**

**Each question carried 20 Marks**

1. a) Discuss various steps in research process.
- b) Define research and Discuss objectives of research in detail.

**Or**

2. a) Discuss the need of ethics in research.
- b) What is the purpose of research. Write about critical evaluation.
3. a) Explain the probability distribution with an example.
- b) Discuss multivariate methods.

**or**

4. a) Write about concepts of correlation and regression.
- b) Discuss Applications of spectral analysis.
5. Describe the relation between frequencies distributions and other graphs

**Or**

6. Discuss about the uses of statistical software R in research
7. a) Explain the importance of cache memory in computer system
- b) Discuss OSI reference model

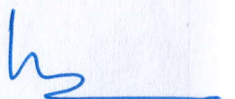
**or**

8. a) Explain critical section problem and semaphores.
- b) Explain in detail about SHA-1

9. a) Write about Asymptotic notations
- b) Discuss minimum spanning trees

**or**

10. a) Explain features of object oriented programming in java
- b) Discuss in detail about Normalization for relational data base.

  
(Prof. P. Suresh Varma)

**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**Pre-Ph.D. Course Work Syllabus**

**Paper – II: WIRELESS SENSOR NETWORKS**

**UNIT-I**

Introduction to Wireless Sensor Network, Applications of Wireless Sensor Network, Wireless Sensor Network Architecture, sensor node architecture, Hardware components, Energy consumption of sensor nodes, Operating systems and execution environments, OSI model, TCP/IP protocol suite, Physical layer and transceiver design considerations in Wireless Sensor Networks. attacks – passive attacks, active attacks.

**UNIT-II**

Fundamentals of MAC Protocols, Performance Requirements, Types of MAC protocols – Schedule Based and Random Access-Based protocols - Sensor-MAC, Zebra-MAC, Timeout T-MAC, B-MAC (Berkeley MAC), Low Energy Adaptive Clustering Hierarchy (LEACH), Traffic Adaptive Medium Access (TRAMA), Light weight MAC (LMAC).

**UNIT-III**

Routing Protocols for Wireless Sensor Networks: Fundamentals of Routing Protocols, Performance Requirements, Routing Strategies in Wireless Sensor Networks - Flooding and its variants, Low Energy Adaptive Clustering Hierarchy (LEACH), Power-Efficient Gathering in Sensor Information Systems, Directed diffusion, Rumor routing, Geographical routing, Minimum Cost Forwarding Algorithm (MCFA), Gradient-Based Routing, COUGAR, Active Query forwarding in sensor networks (ACQUIRE).

**UNIT-IV**

Transport Control Protocols for Wireless Sensor Networks: Traditional Transport Control Protocols-TCP, UDP; Feasibility of Using TCP or UDP for WSNs, Transport Protocol Design Issues, Existing Transport Control Protocols- CODA (Congestion Detection and Avoidance), ESRT (Event-to-Sink Reliable Transport), RMST (Reliable Multi-Segment Transport), PSFQ (Pump Slowly Fetch Quickly), Performance of Transport Control Protocols.

**UNIT-V**

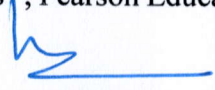
Middleware for Wireless Sensor Networks: WSN Middleware Principles, Middleware Architecture, Existing Middleware-MiLAN (Middleware Linking Applications and Networks), IrisNet (Internet-Scale Resource Intensive Sensor Networks Services), Issues and Challenges in providing QoS, Time synchronization protocols based on sender/receiver synchronization – Reference Based Protocol, Timing SYNC Protocol for Sensor Networks (TPSN), Flooding Time Synchronization Protocol.

**Text Books:**

1. Holger Karl, Andreas Willig, Protocols and Architectures for Wireless Sensor Networks, John Wiley.

2. Kazem Sohraby, Daniel Minoli, Taieb Znati, Wireless Sensor Networks: Technology, Protocols, and Applications, John Wiley.
3. Ananthram Swami, Qing Zhao, Yao-Win Hong, Lang Tong, Wireless Sensor Networks, Signal Processing and Communications Perspectives, John Wiley.
4. C. S. Raghavendra, Krishna M. Sivalingam, Taieb Znati, Wireless Sensor Networks, Kluwer Academic.
5. Bhaskar Krishnamachari, Networking Wireless Sensors, Cambridge University Press.
6. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education - 2008.

**V.KESAVA KUMAR**  
**Research Scholar**  
**Full Time Ph.D. (CSE)**  
**Regd. No: 2002110108**

  
**Prof. P. SURESH VARMA**  
**Research Supervisor**

**MODEL QUESTION PAPER**  
**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**  
**Pre-Ph.D. EXAMINATION 2022**  
**Paper – II: WIRELESS SENSOR NETWORKS**

**Time: 3 Hours**

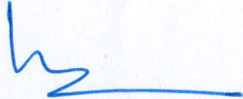
**Max.Marks: 100**

**Answer ALL Questions.**

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1. a) What are the applications of Wireless Sensor Networks?  
b) Discuss in detail about the occurrence of attacks in WSN  
OR  
c) Give the detailed architecture of Sensor node  
d) Write a short note on OSI Model
  
2. a) Discuss about the performance requirements of MAC protocol  
b) Explain about LEACH protocol  
OR  
c) Discuss about the following protocols  
i. Sensor – MAC protocol  
ii. DMAC protocol
  
3. a) Design challenges of routing protocols  
b) Power-Efficient Gathering in Sensor Information Systems  
OR  
c) Classify the Routing protocols  
d) Discuss Geographical routing
  
4. a) Design issues of transport control protocols for WSN  
b) Discuss about CODA  
OR  
c) Feasibility of using TCP or UDP in WSN  
d) Discuss the Performance Issues in Transport control protocols
  
5. a) Discuss Middle ware principles of WSN  
b) Write a short note on MiLAN  
OR  
c) Middle ware architecture of WSN  
d) Write a short note on IrisNet

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**Pre-Ph.D. Course Work Syllabus**  
**Paper – II: CLOUD COMPUTING**

**UNIT-I**

**Introduction to Cloud Computing:** The features of Cloud Computing, the challenges of Cloud computing, the advantages and disadvantages of Cloud Computing.

**Cloud Computing Architecture and Services:** Describe the Cloud Reference Model-Architecture, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS).

**Types of Clouds:** Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Know the Economics of Cloud

**UNIT-II**

**Virtualization:** The different characteristics of Virtualization, Classification of Virtualization Techniques: Machine Reference Model, Hardware Level Virtualization, Operating System Level Virtualization, Programming Language Level Virtualization, Application Level virtualization, Explain the role of virtualization in Cloud Computing, the Pros and Cons of Virtualization, the Virtualization Technologies – Examples Xen, VM ware, Microsoft Hyper-V.

**UNIT-III**

**Cloud Security and Applications:** Define Security, Privacy and Trust, Applications of cloud computing, Scientific Applications-Health Care, Biology, Geo-Science – Satellite Image Processing. Business Applications- Social Networking, Media Applications, Multiplayer Online Gaming

**UNIT-IV**

**Parallel Computing and Distributed Computing:** Concepts of Parallel Computing, Flynn's Hardware architecture for parallel processing, Levels of Parallelism, Laws of Cautions, General Concepts and Definitions of Distributed Computing, Architectural Styles for Distributed Computing, Software architectural Styles, System Architectural Styles. Differentiate Parallel and Distributed Computing.

**UNIT-V**

**Cloud Resource Management and Scheduling:** Policies and mechanisms for resource management, Applications of task scheduling, Stability of a resource allocation architecture, Feedback control based on dynamic thresholds, Categories of Task Scheduling, First Come First Serve (FCFS), Shortest Job First (SJF), Round Robin(RR), MIN-MIN, MAX-MIN, Multi- Level Queue Scheduling.

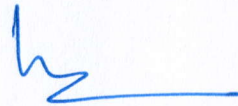
**Text Books:**

1. Cloud Computing : Principles and Paradigms – Rajkumar Buyya, James Broberg and Andrzej Goscinski
2. Mastering Cloud Computing – Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi

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- 3. Cloud Security and Privacy – Tim Mather, Subra Kumaraswamy, Shahed Latif
- 4. First Steps in Cloud Computing – Navin Sabharwal, Ravi Shankar

**SHAIK MASTANBI**  
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**Part Time Ph.D. (CSE)**  
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**Research Supervisor**

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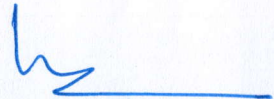
**Time: 3 Hours**

**Max.Marks: 100**

**Answer ALL Questions.**  
**Each Question Carries 20 Marks**

1. a) Explain the features of the cloud computing?  
b) Explain Infrastructure as a service in cloud computing.  
(OR)  
c) Explain Platform as a Service (PaaS) in cloud computing.  
d) Explain about Hybrid clouds.
2. a) Explain the programming language level virtualization.  
b) Explain the VM ware virtualization Technique.  
(OR)  
c) Explain about OS Level virtualization.  
d) Explain the Role of virtualization in cloud computing.
3. a) Explain the Security, Privacy and Trust in Cloud Computing.  
b) Explain the Geo-Science Scientific Application of Cloud Computing.  
(OR)  
c) Explain the Social Networking Business application.  
d) Explain the Health Care Scientific application of cloud computing.
4. a) Explain Flynn's Hardware Architecture for Parallel Processing with neat sketch.  
b) Explain the levels of Parallelism.  
(OR)  
c) Explain Software Architectural Styles of Distributed Computing.  
d) Differentiate Parallel and distributed computing.
5. a) Explain the Policies and mechanisms for resource management.  
b) Explain the MIN-MIN scheduling algorithm.  
(OR)  
c) Explain Multi-Level Queue Scheduling.  
d) Explain the stability of a resource allocation architecture.

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**Pre-Ph.D. Course Work Syllabus**  
**Paper – II: MACHINE LEARNING WITH PYTHON**

**UNIT-I**

**Basics of Python Programming:** Basics of Python Programming-Structure of Python Programme – data types – Literals- constants – operators – Input / Output statements.

**Control Structures:** Selection statements - Iteration statements.

**Data Collection Structures:** Lists, Tuples, Dictionaries.

**OOPs Concepts:** Class and objects – Constructors and destructors – Inheritance – Encapsulation and Polymorphism.

**UNIT-II**

**Data Pre-Processing:** Overview of data pre-processing - data pre-processing.

**Data Cleaning Techniques:** Filling missing values – cleaning and filling missing data – drop missing values – smoothing noisy data – Removing inconsistencies.

**Data Integration and Data Reduction Techniques:** Dimensionality reduction – Numerosity reduction – data compression – Histograms – clustering – sampling Data **Transformation and**

**Data Discretization:** overview of Data Transformation strategies – Discretization by binning - Discretization by Histogram Analysis - Discretization by cluster, Decision tree and correlation analysis.

**UNIT-III**

**Data Analysis: Data Analysis Tools-** Business Intelligence, Statistical analysis, SQL Consoles, Data Visualization. **Data Grouping** - What is data grouping, frequency grouping, histogram, advantages of data grouping. Iterating through Graphs, Aggregations, Transformations, Filtration.

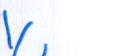
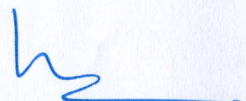
**Data Visualization: Direct Plotting techniques:** Line Plot, Bar Plot, Pie Chart, Box Plot, Histogram Plot, Scatter Plot, **Matplotlib Plot techniques:** Line Plot, Bar Chart, Histogram Plot, Scatter Plot, Stack Plot, Pie Chart.

**UNIT-IV**

**Introduction to Machine Learning:** Human Learning – Types of Human Learning: Learning under expert guidance-learning guided by knowledge gained from experts –learning by itself. Machine Learning – Types of Machine Learning: supervised learning –unsupervised learning-Reinforcement Learning. Applications of Machine Learning and Tools in Machine Learning.

**Supervised Learning:**

**Classification and Regression:** –Naïve Bayes Classification – Linear Regression, Logistic Regression, k-Nearest Neighbors (KNN) - Decision Tree – Random forest Model – Support Vector Machines.



**UNIT-V**

**Unsupervised Learning:** Supervised Vs Unsupervised learning – Introduction to clustering - applications of clustering – types of clustering techniques.

**Types of Unsupervised learning:** Partitioning methods: k-means algorithm – k-medoids algorithm – Hierarchical Method: agglomerative clustering - Principal Component analysis.

**Text Books:**

1. Problem Solving and Python Programming, S.A. Kulakarni, 2<sup>nd</sup> Edition, Yesdee.
2. Data Mining: Concepts and Techniques by Han and Kamber, Second Edition, Morgan Kaufmann Publishers.
3. Data Analysis and Visualization Using Python by Dr. OssamaEmbarak, Apress Publications.
4. Machine Learning by Saikat Dutt, Subramanian Chandra Mouli, Amit Kumar Das, Pearson.

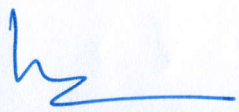
**References:**

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2. Machine Learning, Anuradha Srinivasaraghavan, VincyJoseph, Kindle Edition, 2020, WILEY.

**Online Resources:**

- <https://www.datapine.com/blog/data-analysis-methods-and-techniques/>
- <https://www.shiksha.com/statistics-preparation/grouping-data-3687>

**K. TRINADHA RAVI KUMAR**  
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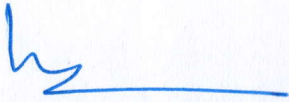
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(b). Explain the basic data types available in Python with examples?  
(OR)  
(c). Explain about the list and tuple with examples?  
(d). Briefly discuss about constructors and destructors?
2. (a). What are the major tasks in Data Preprocessing?  
(b). Explain about data cleaning techniques?  
(OR)  
(c). Explain about the data reduction strategies?  
(d). Explain about the Discretization by cluster, decision tree and correlation analysis?
3. (a). Explain about data analysis tools?  
(b). Explain about the frequency grouping and histogram?  
(OR)  
(c). Explain the concept of aggregation, transformation and filtering?  
(d). Discuss about any 5 direct plotting techniques?
4. (a). What is machine learning? Explain the different types of machine learnings?  
(b). Write about the applications of Machine Learning?  
(OR)  
(c). Briefly discuss about naïve bayes classifier?  
(d). Write algorithm for kNN?
5. (a). Explain the concept of clustering?  
(b). Briefly discuss about the different types of clustering?  
(OR)  
(c). Briefly discuss about the k-means algorithm?  
(d). Explain the Principal Component Analysis method?

**K. TRINADHA RAVI KUMAR**  
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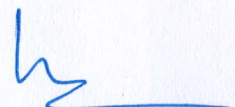
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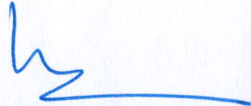
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**UNIT-I**

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**UNIT-II**

**Supervised Learning:**

**Decision Trees:** Introduction, Classification Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data.

**Bayes Theorem, Naive Bayes Classifier:** Example of Naive Bayes Classifier, **Measuring Classifier Accuracy:** Confusion Matrix, Accuracy, Precision, Recall or Sensitivity, F-Score

**Estimating Hypothesis Accuracy:** Sample Error and True Error.

**UNIT-III**

**Instance Based Learning:**

**Support vector machine:** Introduction to Support Vector Machines, Linear Support Vector Machines.

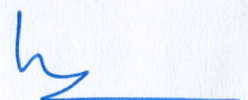
**Ensemble Methods:** Bagging meta-estimator, Random forest, Ada Boost, Gradient and Xgboost,  
**k-Nearest Neighbor Learning:** Choosing Parameters for Nearest Neighbor, KNN Algorithm, Example of KNN,

**Expectation Maximization Algorithm, Case Based Reasoning.**

**UNIT-IV**

**Introduction to Machine Learning: Human Unsupervised Learning:** Supervised Vs Unsupervised learning – Introduction to clustering - applications of clustering – types of clustering.

**Types of Unsupervised learning:** partitioning methods: k-means algorithm – k-medoids algorithm – hierarchical Method: agglomerative clustering - Principal Component analysis (PCA) – Self Organizing Map (SOM) – Apriori Algorithm - Density Based DBSCAN clustering.



**UNIT-V**

**Reinforcement learning:** The learning Task, Elements of Reinforcement learning,

**Q-Learning:** The Q Function, An algorithm for Learning Q, An illustrative Example,

**Model based Learning:** Value Iteration, Policy Iteration,

**Temporal Difference learning:** Exploration Strategies, Deterministic Rewards and Actions, Non Deterministic Rewards and Actions.

**Text Books:**

- 5. Introduction to Machine Learning, Ethem Alpaydin, Second Edition, 2010, Prentice Hall of India.
- 6. Machine Learning, Anuradha Srinivasa raghavan, and Vincy Joseph, Kindle Edition, 2020, WILEY.

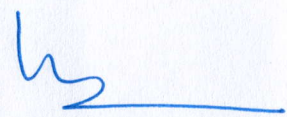
**References:**

- 1. Machine Learning by Tom M. Mitchell, International Edition 1997, McGraw Hill Education.
- 2. "Deep Learning", Ian Goodfellow, Yoshua Bengio, Aaron Courville, 2016, MIT Press.
- 3. Machine Learning a Probabilistic Perspective, Kevin P Murphy & Francis Bach, First Edition, 2012, MIT Press.
- 4. Introduction to Data Mining, Tan, Vipin Kumar, Michael Steinbach, Ninth Edition, 2013, Pearson

**Online Resources:**

- 1. <https://www.coursera.org/learn/machine-learning>
- 2. <https://nptel.ac.in/courses/106/106/106106139/>

**P ANIL KUMAR**  
**Research Scholar**  
**Part Time Ph.D(CSE)**  
**Reg.No: 2002120118**



**Prof. P SURESH VARMA**  
**Research Supervisor**  
**University College of Engineering**  
**Adikavi Nannaya University**



**MODEL QUESTION PAPER**  
**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**  
**Pre-Ph.D. EXAMINATION 2022**  
**Paper – II: MACHINE LEARNING**

**Time: 3 Hours**

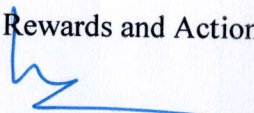
**Max.Marks: 100**

**Answer ALL Questions.**

**Each Question Carries 20 Marks**

1. (a). What are the major tasks in Data Preprocessing?  
(b). Explain about data cleaning techniques?  
(OR)  
(c). Explain about the data reduction strategies?  
(d). Explain about the Discretization by cluster, decision tree and correlation Analysis?
2. (a). What do you mean by Gain and Entropy? How is it used to build the Decision tree in algorithm? Illustrate using an example.  
(b). What measures are used to improve the performance of classifier accuracy?  
(OR)  
(c). Explain Nave Bayes Classifier and compare it to the conventional model using appropriate measures.  
(d). How to choose nearest neighbor Parameters for KNN algorithm with an example.
3. (a). Explain the concept of EM Algorithm.  
(b). Organize the generic properties of systems that use case-based reasoning.  
(OR)  
(c). Explain about Support Vector Machines with an Example.  
(d). Difference between Bagging and Boosting with an Example.
4. (a). Explain the concept of clustering?  
(b). Briefly discuss about the different types of clustering?  
(OR)  
(c). Briefly discuss about the k-means algorithm?  
(d). Explain the Principal Component Analysis method?
5. (a). Construct a Q Function in the context of the Q learning algorithm.  
(b). How to make value iteration more effective by utilizing model-based learning.  
(OR)  
(c). Build a model for Temporal Difference Learning using an example.  
(d). Differentiate Deterministic Rewards and Actions, Non Deterministic Rewards and Actions with an Example.

**P.ANIL KUMAR**  
**Research Scholar**  
**Part Time Ph.D. (CSE)**  
**Regd. No: 2002120118**

  
**Prof. P. SURESH VARMA**  
**Research Supervisor**

M. Ram Bhyal

**ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVRAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre PhD Examination -2022**  
**PAPER – II: MOBILE COMPUTING**

**UNIT-I**

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture, Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces,

**UNIT-II**

Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

(Wireless) Medium Access Control (MAC) :Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

**UNIT-III**

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks

**UNIT-IV**

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process &QoS Issues.

**UNIT-V**

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

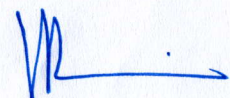
Protocols and Platforms for Mobile Computing :WAP, Bluetooth, XML, J2ME, Java Card, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

**Text Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Se
2. UWE Hansmann, LotharMerk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

**Reference Books:**

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772



**ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVRAM**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre PhD Examination 2022 - Model Question Paper**

**PAPER – II: MOBILE COMPUTING**

Duration: 3 Hrs

Max Marks: 100

All Questions carry EQUAL marks

5 x 20 = 100 M

**UNIT - I**

1. What are the subsystems in used in GSM network architecture? Explain the functionality of each unit with GSM architecture.

(or)

2. Enlist the applications of Mobile computing What are the limitations of Mobile and Handheld Devices.

**UNIT - II**

3. Give the main reason for implementing specialized MAC in wireless networks.

(or)

4. Explain about the Code Division Multiple Access technique.

**UNIT – III**

5. What is Mobile IP? Explain with diagram.

(or)

6. What is DHCP? Explain how dynamic configuration is performed by DHCP.

**UNIT - IV**

7. Discuss the challenges and issues in implementing MANETs

(or)

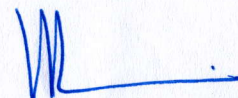
8. a) Discuss transactional models.  
b) What is Query processing? Explain.

**UNIT - V**

9. Describe WAP architecture

(or)

10. Explain the Tree based Index/Distributed indexing scheme and also discuss its merits and demerits.



**ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVRAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre PhD Examination -2022**  
**PAPER – II: INTERNET OF THINGS**

**UNIT – I**

**Fundamentals of IoT:** Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

**UNIT – II**

**Sensors Networks:** Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

**UNIT – III**

**Wireless Technologies for IoT:** WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE. IP Based Protocols for IoT IPv6, RPL, REST. Edge connectivity and protocols

**UNIT – IV**

**Data Handling & Analytics:** Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics.

**UNIT – V**

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

**TEXT BOOKS:**

1. Hakima Chaouchi, — “The Internet of Things Connecting Objects to the Web” ISBN : 978-1- 84821-140-7, Wiley Publications
2. Olivier Hersent, David Boswarthick, and Omar Elloumi, — “The Internet of Things: Key Applications and Protocols”, Wiley Publications
3. Vijay Madiseti and Arshdeep Bahga, — “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014. 4. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 2016. 5. Keysight Technologies, “The Internet of Things: Enabling Technologies and Solutions for Design and Test”, Application Note, 2016.

**REFERENCES:**

1. Daniel Minoli, — “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Wiley Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
3. [https://onlinecourses.nptel.ac.in/noc17\\_cs22/course](https://onlinecourses.nptel.ac.in/noc17_cs22/course)
4. [http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot\\_prot/index.html](http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html)

**ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVRAM**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre PhD Examination Model Question Paper -2022**

**PAPER – II: INTERNET OF THINGS**

Duration: 3 Hrs

Max Marks:

All Questions carry EQUAL marks

5 x 20 = 100 M

**UNIT - I**

1. Explain about design objectives of IoT architecture.  
(or)
2. Explain various Identifiers in IoT? Explain about Frameworks in IoT?

**UNIT - II**

3. Explain various types of Sensors.  
(or)
4. Explain the Sensor Modules in Arduino.

**UNIT – III**

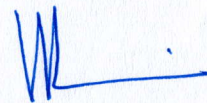
5. Explain about Wireless Technologies for the IoT.  
(or)
6. Explain about Edge Connectivity in IP Based Protocol for IoT

**UNIT - IV**

7. Explain Types of Data Analytics?  
(or)
8. Explain about Data Handling and Analytics

**UNIT - V**

9. Explain various IoT Applications.  
(or)
10. Explain the Legal challenges in IoT. ....



**ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVRAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre PhD Examination -2022**  
**PAPER – II: SOFTWARE ENGINEERING**

**UNIT-I**

**Software Engineering Process Models:** The Software Problem, Cost, Schedule, and Quality, Scale and Change, Software Processes: Process and Project, Component Software Processes, Software Development Process Models: Waterfall Model, Prototyping, Iterative Development, Rational Unified Process, Timeboxing Model, Extreme Programming and Agile Processes, Using Process Models in a Project

**UNIT-II**

**Software Requirements Analysis and Specification:** Value of a Good SRS, Requirement Process, Requirements Specification, Desirable Characteristics of an SRS, Components of an SRS, Structure of a Requirements Document.

**Planning:** Effort Estimation, Top-Down Estimation Approach, Bottom-Up Estimation Approach, Project Schedule and Staffing, Quality Planning, Risk Management Planning, Risk Management Concepts, Risk Assessment, Risk Control, A Practical Risk Management Planning Approach, Project Monitoring Plan, Measurements, Project Monitoring and Tracking, Detailed Scheduling.

**UNIT-III**

**Design:** Design Concepts, Coupling, Cohesion, The Open-Closed Principle, Function-Oriented Design, Structure Charts, Structured Design Methodology, An Example

**Coding:** Programming Principles and Guidelines, Structured Programming, Information Hiding, Some Programming Practices, Coding Standards, Incrementally Developing Code, An Incremental Coding Process, Test-Driven Development, Pair Programming. Managing Evolving Code: Source Code Control and Build, Refactoring.

**UNIT-IV**

**Testing:** Testing Concepts, Error, Fault, and Failure, Test Case, Test Suite, and Test Harness, Levels of Testing, Testing Process, Test Plan, Test Case Design, Black-Box Testing, Equivalence Class Partitioning, Boundary Value Analysis, Pairwise Testing, State-Based Testing, White-Box Testing, Control Flow-Based Criteria, Test Case Generation and Tool Support, Metrics, Coverage Analysis, Reliability, DRE

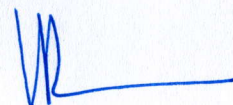
**UNIT –V**

**Object oriented concepts:** Classes and objects, Attributes, Operations, Methods and services. **Identifying the elements of an object model:** Identifying classes and objects, specifying attributes, Defining operations, finalizing the object definition.

**Management of object oriented software projects:** The common process framework for OO, Object oriented project metrics and estimation.

**TEXT BOOKS:**

1. Software Engineering: A Practitioner's Approach – Roger S Pressman, Seventh Edition McGraw Hill International Edition.
2. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.



**ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVRAM**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre PhD Examination Model Question Paper -2022**

**PAPER – II: SOFTWARE ENGINEERING**

Duration: 3 Hrs

Max Marks: 100

All Questions carry EQUAL marks

5 x 20 = 100 M

**UNIT - I**

1. Explain software development process models in detail.  
(or)
2. Explain the terms cost, schedule, quality, scale and change.

**UNIT - II**

3. Give various steps involved in good Software Requirements Specification (SRS).  
(or)
4. Explain different estimation approaches in detail.

**UNIT – III**

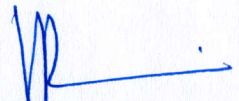
5. Discuss various designing concepts.  
(or)
6. Describe various coding approaches.

**UNIT - IV**

7. Explain testing concepts with examples.  
(or)
8. Discuss tools used in testing.

**UNIT - V**

9. Explain object oriented concepts in detail.  
(or)
10. Discuss about management of object oriented software projects.



ADIKAVI NANNAYA UNIVERSITY  
UNIVERSITY COLLEGE OF ENGINEERING  
PRE PH.D(2021-22) SYALLABUS

ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING  
AND DEEP LEARNING TECHNIQUES

UNIT I

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation. Relation between Artificial Intelligence and Machine Learning.(Artificial Intelligence-Stuart Russel and Peter Norvig))

Machine Learning: What and Why, Supervised Learning and Unsupervised Learning, Some basic concepts in Machine Learning

Probability: A brief review, Common discrete distributions, common continuous distributions, Joint probability distributions, Transformations of random variables, Monte Carlo approximation( Machine Learning -A Probabilistic Perspective-Kevin P.Murphy)

UNIT II

Classification: Decision tree induction, Bayes Classification methods, Classification by Back Propagation, Model evaluation and selection, Ensemble Techniques: Bagging and boosting, Random forest, improving classification accuracy.Support Vector Machines, Lazy Learners, Genetic Algorithms, Rough set approaches and Fuzzy set approaches.

Clustering: Partitioning methods, Hierarchical methods and Density based methods( Data Mining concepts and Techniques: Han and Kamber)

UNIT III

Linear Regression: Linear regression, Simple and Multiple Linear regression, Polynomial regression, evaluating regression fit, Logistic Regression.

Activation Functions: Sigmoid, ReLU, Hyperbolic Fns, Soft max Perceptrons: What is a Perceptron, XOR Gate Artificial Neural Networks: Perceptron Training Rule, Gradient Descent Rule, vanishing gradient problem and solution

(Deep Learning: A Practitioner's Approach, Josh Patterson O'Reilly, 2017)

UNIT IV

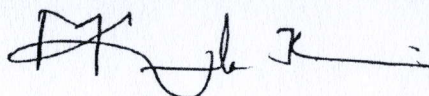
Convolutional Neural Networks: Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, problem and solution of under fitting and over fitting(Deep Learning, Good fellow - MIT Press, 2016)

Deep Learning for Computer Vision: Training a convent from scratch, Using a pertained convent, Visualising what convents Learn.

UNIT V

Deep Learning for text and sequences: Working with text data, Understanding RNN, Advanced use of RNN,, Sequence Processing with convents.(Deep Learning with Python-Francois Chollet)

Deep Learning applications: Image segmentation, Object detection, Attention model for computer vision tasks, Natural Language Processing, Speech Recognition, Video Analytics





### PRESCRIBED TEXTBOOKS

1. S. Russel and P. Norvig, -Artificial Intelligence -A Modern Approach||, Second Edition, Pearson Education 2003.
2. Deep Learning with Python-Francois Chollet - Manning Publishers.
3. Data Mining Concepts and techniques: J. Han, M.Kamber, J.Pei-MK Third Edition

### REFERENCE TEXTBOOKS

1. Deep Learning: A Practitioner's Approach, Josh Patterson-OReilly, 2017
2. Deep Learning, Good fellow - MIT Press, 2016
3. Machine Learning, Tom Mitchell

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ADIKAVI NANNAYA UNIVERSITY  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
Pre-PhD Examination-2021-2022

Paper-II:-ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING  
AND DEEP LEARNING TECHNIQUES

PRE-PH.D(2021-22) MODEL QUESTION PAPER(5\*20=100M)

1. a. What is Artificial Intelligence? What is the structure of agents? What are Problem solving agents? [10]  
b. Explain the concept of rationality. What is the relation between Artificial Intelligence and Machine Learning. Explain Monte Carlo approximation [10]

OR

- c. What is machine Learning. Explain the basic concepts of machine Learning.[10]  
d. Explain discrete distributions and continuous distributions [10]
2. a. Explain Decision Tree Induction with an example. [10]  
b. Explain Ensemble Techniques. [10]

OR

- c. Explain Support Vector Machines.[10]  
d. What are Lazy Learning Techniques and Active Learning Techniques. Explain.[10]
3. a. Explain Linear Regression and Logistic Regression.[10]  
b. Explain Convolution, Striding, Kernel, padding and activation functions. [10]

OR

- c. Explain Multiple Linear Regression and Polynomial Regression[10]  
d. Explain Gradient Descent Rule and its purpose.[10]
4. a. What are Convolution Neural Networks. Explain.[10]  
b. Explain Multiple Filters and Overfitting and Under fitting.[10]

OR

- c.Explain the Deep Learning for Computer vision[10].  
d.Explain visualization of what convnets learn.[10]
5. a. Explain Deep Learning for Text and Sequences. Explain Image segmentation[10]  
b. Explain the concept of Recurrent Neural Networks[10]

OR

- c. Explain Deep Learning for Natural Language Processing.[10]  
d.Explain Deep Learning Applications and the suitable techniques that are used in all applications with examples[10]

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**ADIKAVI NANNAVA UNIVERSITY : RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre-PhD Coursework Syllabus**

**Paper-11: MACHINE LEARNING WITH PYTHON**

**Unit 1: Introduction Learning Problems-** Perspectives and Issues - Concept Learning -Version Spaces and Candidate Eliminations, Inductive bias- Decision Tree learning -Representation Algorithm, Heuristic Space Search.

**Unit 2: Neural Network and Genetic Algorithms:** Neural Network Representation - Problems for Neural Network Learning, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Advanced Topics in Neural Networks, Genetic Algorithms - Hypothesis, Space Search, Genetic Programming-Models of Evolution and Learning.

**Unit 3: Bayesian and Computational Learning:** Bayes Theorem Concept Learning, Maximum Likelihood - Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Native Bayes Classifier-Bayesian Belief Network-EM Algorithm-Probably, Learning-Sample Complexity - Finite and Infinite Hypothesis Spaces - Mistake Bound Model.

**Unit 4: Decision Tree and Instance Based Learning:** Decision Tree Representation- Problems for Decision Tree Learning- Basic Decision Tree Algorithm- Hypothesis Space Search-Inductive Bias - Issues in Decision Tree Learning - K- Nearest Neighbor Learning - Locally Weighted Regression- Radial Bases Functions-Case Based Learning

**Unit 5. Basics of Python Programming:** Basics of Python Programming-Structure of Python Programme – data types – Literals- constants – operators – Input / Output statements. Control Structures: Selection statements - Iteration statements. Data Collection Structures: Lists, Tuples, Dictionaries. OOPs Concepts: Class and objects – Constructors and destructors – Inheritance – Encapsulation and Polymorphism.

**Text Book**

1. Machine Learning Tom M. Mitchell, McGraw Hill
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.
3. Data Mining Methods and Models. Daniel T Larose, Wiley Interscience.
4. Problem Solving and Python Programming, S.A. Kulakarni, 2nd Edition, Yesdee.

**Reference Book**

- 1- Machine Learning. An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

SCHOLAR NAME:

N. VENKATESWARA RAO

REGD.No: 2002110102



(Dr. P. VENKATESWARA RAO)

**MODEL QUESTION PAPER**

**ADIKAVI NANNAYA UNIVERSITY : RAJAMAHENDRAVARAM  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre-PhD Examinations**

**Paper-II MACHINE LEARNING WITH PYTHON**

Time : 3Hrs

Max Marks: 100

Answer all the questions

Each question carries 20 marks

1. (a) Explain the design issues and approached to machine learning. (10)  
(b) Define Concept learning. Explain the tasks in concept learning. (10)  
(OR)  
(c) Explain with example the Candidate-Elimination algorithms. (20)
2. (a) What are the characteristics of problems for which Artificial Neural Networks are well suited? (5)  
(b) Explain the Backpropagation algorithm. (15)  
(OR)  
(c) Explain the Genetic Algorithm (10)  
(d) Explain the models of evolution and learning. (10)
3. (a) State and explain Bayes theorem. How is applied for concept learning. (10)  
(b) Explain the EM algorithm. (10)  
(OR)  
(c) Explain the Probably Approximately Correct learning model. (10)  
(d) Explain the Weighted Majority Algorithm. (10)
4. (a) Illustrate how the (im)purity of training examples is measured. Define and explain with example the measure of effectiveness of an attribute in classifying training data. (8)  
(b) Explain the approaches that can be taken to reduce the problem of overfitting. (12)  
(OR)  
(c) Explain the k-Nearest Neighbor algorithm. (10)  
(d) Explain Locally Weighted Regression. (10)
5. (a) Explain the structure of python program with an example? (10)  
(b) Explain the basic data types available in Python with examples? (10)  
(OR)  
(c) Explain about the list and tuple with examples? (10)  
(d) Briefly discuss about constructors and destructors? (10)

SCHOLAR NAME :

N. VENKATESWARA RAO

REGD.No: 2002110102

*Pr*

( Dr. P. VENKATESWARA RAO )

**ADIKAVI NANNAYA UNIVERSITY : RAJAMAHENDRAVARAM  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre-PhD Coursework Syllabus**

**Paper-II: COMPUTER NETWORKS AND SECURITY**

**UNIT-I**

**Network layer:** Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets, Routing Algorithms-shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing.

**Congestion control algorithms:** Approaches to congestion control, Traffic aware routing, Admission control, Traffic throttling, choke Packets, Load shedding, Random early detection, Quality of Service, Application requirements, Traffic shaping, Leaky and Token buckets

**UNIT-II**

**Internetworking and IP protocols:** How networks differ, how networks can be connected, internetworking, tunneling, The network layer in the internet, IPV4 Protocol, IP addresses, Subnets, CIDR, class full and Special addressing, network address translation (NAT), IPV6 Address structure address space, IPV6 Advantages, packet format, extension Headers, Transition from IPV4 to IPV6, Internet Control Protocols-IMCP, ARP, DHCP

**UNIT-III**

**Transport Layer Protocols:** Introduction, Services, Port numbers, User Datagram Protocol: User datagram, UDP services, UDP Applications, Transmission control Protocol: TCP services, TCP features, Segment, A TCP connection, State transition diagram, Windows in TCP, Flow control and error control, TCP Congestion control, TCP Timers, **SCTP:** SCTP services SCTP features, packet format, An SCTP association, flow control, error control.

**UNIT-IV**

**WWW and HTTP:** Architecture-client(Browser), Server, Uniform Resource Locator, Cookies, Web documents- Static documents, dynamic documents, active documents, HTTP- HTTP transaction, persistent versus Non-persistent connection, proxy server. **Network Management System:** Configuration management, Fault Management, Performance management, security management, accounting management, SNMP-concept -Management components- Structure of Management information, Management information base. **Cryptography:** Introduction, Symmetric key cryptography -Asymmetric key cryptography.

**UNIT-V**

**Network Security:** Security services, Message confidentiality, Message Integrity, Message authentication, Digital signature, Entity authentication, Key management. **Security in the Internet:** IP Security (IPSec), SSL/TLS, PGP, Firewalls

**Text Books:**

1. Data communications and networking 4<sup>th</sup> edition Behrouz A Fourzan, TMH
2. Computer networks 4<sup>th</sup> edition Andrew S Tanenbaum, Pearson
3. Computer networks, Mayank Dave, CENGAGE

**Reference Books:**

1. Computer networks, A system Approach, 5<sup>th</sup> ed, Larry L Peterson and Bruce S Davie, Elsevier

SCHOLAR NAME :

K. MOUNICA

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(D. P. VENKATESWARA PAI)

**MODEL QUESTION PAPER**  
**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**  
**Pre-Ph.D. Examinations**

**Paper – II: COMPUTER NETWORKS AND SECURITY**

**Time: 3 Hours**

**Max.Marks: 100**

**Answer ALL Questions.**  
**Each Question Carries 20 Marks**

1. (a) Discuss the Design Issues of Network layer and Compare Virtual Circuit & Datagram Networks?  
(b) Discuss about Routing Algorithm and Differentiate Distance vector routing, Link state Routing?

**(OR)**

- (c) Briefly Explain different Congestion Control algorithms?

2. (a) Describe Class-full Classification of IPV4?  
(b) Discuss Advantages of IPV6 over IPV4 and Describe the frame format of IPV6?

**(OR)**

- (c) Discuss the importance of Network Address Translation(NAT)  
(d) Write short notes on ICMP and ARP?

**(OR)**

3. (a) Discuss about TCP Services and TCP header format?  
(b) Describe Flow control and Error control in TCP Protocol?
- (OR)**
- (c) Discuss about UDP Services and UDP applications?  
(d) What is Stream Control Transmission Protocol (SCTP) and briefly explain flow control and error control?

4. (a) What is web document and briefly explain static, dynamic and active documents?  
(b) Differentiate persistent and non-persistent connections?

**(OR)**

- (c) Discuss about SNMP?  
(d) Write short notes on Symmetric key cryptography and Symmetric key cryptography?

5. (a) Explain security services?  
(b) Briefly discuss about digital signature and key management?

**(OR)**

- (c) Explain SSL protocol?  
(d) What is e-mail security and briefly explain PGP protocol?

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**ADIKAVI NANNAYA UNIVERSITY : RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre-PhD Coursework Syllabus**  
**Paper-II: NETWORK SECURITY AND CRYPTOGRAPHY**

**UNIT-I**

**Introduction:** The need for security -Security approaches- Principles of security- Plain Text and Cipher Text- Substitution and Transposition Techniques-Encryption and Decryption- Symmetric and Asymmetric Cryptography-Stenography-key range and key size- Types of attacks.

**Number Theory:** Introduction- Prime and relatively prime numbers- Modular Arithmetic- Euclidean algorithm- Euler theorem- Fermat Theorem- Totient Function- Multiplicative and Additive Inverse.

**UNIT-II**

**Symmetric Key Cryptographic Algorithms:** Algorithm types and modes- Overview of symmetric key cryptography – DES – IDEA –RC5- Blowfish – AES-Differential and Linear Cryptanalysis.

**Asymmetric Key Cryptographic Algorithms:** Overview of asymmetric key cryptography- RSA algorithm- Symmetric and asymmetric key cryptography together -Digital signatures.

**UNIT-III**

**User Authentication and Message Authentication:** Introduction-Authentication basics- Passwords- Authentication tokens -Certificate based authentication -Biometrics Authentication- Kerberos- Message authentication requirements -Message authentication functions- MAC.

**Public key infrastructure:** Introduction- Digital certificates- Private key management- The PKIX model- Public key cryptography standards(PKCS).

**UNIT-IV**

**Hash functions** Introduction to hash functions-SHA512- - Digital Signatures- RSA digital signature-DSS digital signature.

**System Security:** Intruders- Intrusion detection techniques- Viruses- Types of viruses- Virus counter measures- Related Threats, Trusted Systems.

**UNIT-V**

**Internet Security Protocols:** Basic concepts-SSL-TLS-SHTTP-TSP-SET-SSL versus SET- 3D Secure Protocol-Electronic Money-Email security (PGP & S/MIME)-WAP security-security in GSM.

**Network Security, Firewalls and Virtual private network:** Brief Introduction to TCP/IP -Firewalls -IP Security-Virtual Private Networks(VPN).

**Text Books:**

1. Cryptography and Network security, AtulKahate, Tata McGraw-Hill Pub company Ltd., New Delhi
2. Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi

**Reference Books:**

1. Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., NewDelhi
2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes - Ousley, Keith Strass berg TataMcGraw-Hill.

SCHOLAR NAME:

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**MODEL QUESTION PAPER**

ADIKAVI NANNAYA UNIVERSITY : RAJAMAHENDRAVARAM  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Pre-PhD Examinations

Paper-II: NETWORK SECURITY AND CRYPTOGRAPHY

Time:3 Hrs

Max. Marks: 100

Answer all the questions  
Each question carries 20 marks

1. a). Explain Principles of Security?  
b). Discuss substitution and transportation techniques?  
OR  
c). What is modular arithmetic and write short notes on operations and properties?  
d). Discuss Euler theorem and Fermat Theorem?
2. a). Briefly explain different algorithm types and modes?  
b). Explain AES algorithm?  
OR  
c). Explain RSA algorithm and perform encryption and decryption using the RSA algorithm for  $p=5$ ,  $q=11$ ,  $e=3$  and  $m=9$ ?
3. a). Discuss different authentication mechanisms?  
b). Explain Kerberos authentication mechanism with diagram?  
OR  
c). Describe digital certificates?  
d). Explain private key management system?
4. a). Explain SHA512 algorithm?  
b). What is digital signature and explain RSA digital signature system?  
OR  
c). Discuss different intrusion detection techniques?  
d). What is virus and explain types of viruses?
5. a). Explain SSL protocol?  
b). Explain PGP protocol?  
OR  
c). What is firewall? Discuss different types of firewalls?  
d). Explain IP Security overview?

SCHOLAR NAME:

ADAPA MUTYA SIRISHA

REG. No: 2002120102

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**ADIKAVI NANNAYA UNIVERSITY : RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre-PhD Coursework Syllabus**  
**Paper-II: NETWORK SECURITY AND CRYPTOGRAPHY**

**UNIT-I**

**Introduction:** The need for security -Security approaches- Principles of security- Plain Text and Cipher Text- Substitution and Transposition Techniques-Encryption and Decryption- Symmetric and Asymmetric Cryptography-Stenography-key range and key size- Types of attacks.

**Number Theory:** Introduction- Prime and relatively prime numbers- Modular Arithmetic- Euclidean algorithm- Euler theorem- Fermat Theorem- Totient Function- Multiplicative and Additive Inverse.

**UNIT-II**

**Symmetric Key Cryptographic Algorithms:** Algorithm types and modes- Overview of symmetric key cryptography – DES – IDEA –RC5- Blowfish – AES-Differential and Linear Cryptanalysis.

**Asymmetric Key Cryptographic Algorithms:** Overview of asymmetric key cryptography- RSA algorithm- Symmetric and asymmetric key cryptography together -Digital signatures.

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**Public key infrastructure:** Introduction- Digital certificates- Private key management- The PKIX model- Public key cryptography standards(PKCS).

**UNIT-IV**

**Hash functions** Introduction to hash functions-SHA512- - Digital Signatures- RSA digital signature-DSS digital signature.

**System Security:** Intruders- Intrusion detection techniques- Viruses- Types of viruses- Virus counter measures- Related Threats, Trusted Systems.

**UNIT-V**

**Internet Security Protocols:** Basic concepts-SSL-TLS-SHTTP-TSP-SET-SSL versus SET- 3D Secure Protocol-Electronic Money-Email security (PGP & S/MIME)-WAP security-security in GSM.

**Network Security, Firewalls and Virtual private network:** Brief Introduction to TCP/IP -Firewalls -IP Security-Virtual Private Networks(VPN).

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2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes - Ousley, Keith Strass berg TataMcGraw-Hill.

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8

**MODEL QUESTION PAPER**

ADIKAVI NANNAYA UNIVERSITY : RAJAMAHENDRAVARAM  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Pre-PhD Examinations

Paper-II: NETWORK SECURITY AND CRYPTOGRAPHY

Time:3 Hrs

Max. Marks: 100

Answer all the questions  
Each question carries 20 marks

1. a). Explain Principles of Security?  
b). Discuss substitution and transportation techniques?  
OR  
c). What is modular arithmetic and write short notes on operations and properties?  
d). Discuss Euler theorem and Fermat Theorem?
2. a). Briefly explain different algorithm types and modes?  
b). Explain AES algorithm?  
OR  
c). Explain RSA algorithm and perform encryption and decryption using the RSA algorithm for  $p=5$ ,  $q=11$ ,  $e=3$  and  $m=9$ ?
3. a). Discuss different authentication mechanisms?  
b). Explain Kerberos authentication mechanism with diagram?  
OR  
c). Describe digital certificates?  
d). Explain private key management system?
4. a). Explain SHA512 algorithm?  
b). What is digital signature and explain RSA digital signature system?  
OR  
c). Discuss different intrusion detection techniques?  
d). What is virus and explain types of viruses?
5. a). Explain SSL protocol?  
b). Explain PGP protocol?  
OR  
c). What is firewall? Discuss different types of firewalls?  
d). Explain IP Security overview?

SCHOLAR NAME :

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**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVRAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre-PhD Coursework Syllabus**  
**Paper – II: BLOCKCHAIN TECHNOLOGY**

**UNIT – I**

**Introduction to Blockchain:** The History of Blockchain,, Decentralisation of Blockchain, Block In a Blockchain, Distributed Ledger, Private, Public and Consortium Blockchains, Permission less and Permissioned Blockchains, The Longest Chain of Blockchain, Basic Distributed System Concepts, Distributed Consensus, Byzantine Fault Tolerant Consensus Methods.

**UNIT – II**

**Cryptography in Blockchain:** Objectives of Cryptography, Properties of a Hash Function, Cryptographic Hash Function, Hash Pointer, Merkle Tree, Symmetric Key Cryptography – DES, AES; Asymmetric Key Cryptography – RSA; Digital Signatures, SHA256, Elliptic Curve Cryptography Algorithm

**UNIT – III**

**Bitcoin-Cryptocurrency:** Bitcoin Transaction Life Cycle, Types of Transaction, UTXO, The Genesis Block, Mining, Task of Miners, Proof of Work, Mining Algorithm, Bitcoin Network, Bitcoin Scripts, Bitcoin Payments, Alternative Coins

**UNIT – IV**

**Hyperledger Fabric:** Architecture, Transaction Flow in Fabric, Channels in Fabric, Fabric Network setup.

**Ethereum :** Smart Contracts, Solidity for Contract Writing, Deploy and Interact with a Contract

**Python:** Creating Client Class and Transaction Class, Creating Blockchain, Adding Genesis Block, Creating Miners, Adding Blocks

**UNIT – V**

**Usecases of Blockchain:** Blockchain in Financial Service, Blockchain in Supply chain, Blockchain in Healthcare, Blockchain in Education, Blockchain In Media, Preventing Cybercrime through Blockchain, Blockchain for e-Governance, Blockchain for Tax payments, Blockchain for Land Registry Records, Blockchain in IoT

**TEXT BOOKS:**

- 1.S Shukla, M Dhawan, S Sharma, S Venkatesan, "Blockchain Technology: Cryptocurrency and Applications" Oxford University Press, 2019
2. Aravind Narayanan, Joseph B, Edward F, "Bitcoin and Cryptocurrency Technologies", Princeton University Press.
3. Imran Bashir, "Mastering Blockchain" Packt Publishing, Birmingham, UK
4. Blockchain Architecture Design and Usecases, NPTEL Course
5. Arjun Sky Kok, "Blockchain for Python Developers", Kindle Edition
6. Jitendra Ch, "Blockchain Programming with Solidity", Kindle edition

**REFERENCES:**

1. Josh Thompson, "The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming", Create Space Independent Publishing Platform, 2017.
2. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies"
3. Hyperledger Fabric [www.hyperledger.org/projects](http://www.hyperledger.org/projects)

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**MODEL QUESTION PAPER**

**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVRAM  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre-PhD Examinations**

**Paper – II: BLOCKCHAIN TECHNOLOGY**

Time: 3 Hrs

Max Marks: 100

Answer all the questions

Each question carries 20 marks

1. Explain different types of blockchains and their applicability in a contextual setting.  
(or)
2. Explain the concept of Byzantine Fault Tolerant Consensus Methods.
3. Merkle tree is one of the fundamental data structures employed in a blockchain.  
Explain its working with an example.  
(or)
4. Describe the working of Elliptic Curve Cryptography Algorithm with an example.
5. Explain Proof of Work mining algorithm. Discuss its complexity.  
(or)
6. Describe any 3 cryptocurrencies and their network setup along with functioning.
7. Explain hyperledger fabric architecture.  
(or)
8. a) a Simple smart contract using Solidity    b) Creation of blockchain in Python
9. Discuss the uscases of Blockchain in Education.  
(or)
10. Briefly explain how IoT can be integrated with Blockchain.

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**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre Ph.D Course Work Syllabus**

**PAPER-II - BIOMETRICS WITH ARTIFICIAL INTELLIGENCE TECHNIQUES**

**UNIT - I**

**INTRODUCTION TO BIOMETRICS**

Person Recognition, Biometric Systems, Enrolment and recognition phases, Sensor module, Feature extraction module, Database module, Matching module, Biometric Functionalities, Verification, Identification, Biometric System Errors, Performance measures, The Design Cycle of Biometric Systems, Nature of the application, Choice of biometric trait, Data collection, Choice of features and matching algorithm, Evaluation, Applications of Biometric Systems, Security and Privacy Issues

**UNIT - II**

**TYPES OF BIOMETRICS**

Physiological Biometrics: Fingerprint recognition, Face recognition, Additional Biometric traits, Soft Biometrics, Multibiometrics, Sources of multiple evidence, Acquisition and processing architecture, fusion levels

Behavioural biometrics: Voice identification, signature Identification, Keystroke dynamics, Graphical based authentication methods, Mouse dynamics, Multi modal Biometrics systems

**UNIT - III**

**IRIS RECOGNITION MECHANISM**

Introduction, Design of an Iris Recognition System, Image Acquisition, Iris Segmentation, Segmentation using the integro-differential operator, Segmentation using Geodesic Active Contours (GAC), Generating iris masks, Iris Normalization, Iris Encoding and Matching, Iris Quality, Quality assessment techniques, Performance Evaluation

**UNIT-IV**

**MACHINE LEARNING CONCEPTS**

A Simple Machine-Learning Task , Training Sets and Classifiers, Minor Digression: Hill-Climbing Search, Hill Climbing in Machine Learning , The Induced Classifier's Performance, Some Difficulties with Available Data, Probabilities: Bayesian Classifiers, The Single-Attribute Case, Vectors of Discrete Attributes, How to Handle Continuous Attributes

**UNIT-V**

**ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING CONCEPTS**

Artificial Neural Networks, Multilayer Perceptrons as Classifiers, Neural Network's Error, Back propagation of Error, Special Aspects of Multilayer Perceptrons, Architectural Issues, Radial-Basis Function Networks, Decision Trees, Decision Trees as Classifiers, Induction of Decision Trees, How Much Information Does an Attribute Convey, Binary Split of a Numeric Attribute, Pruning, Converting the Decision Tree into Rules.

**Textbooks:**

1. Biometrics: Concepts and applications – G. R. Sinha, Sandeep. B. Patil – Wiley publications
2. Introduction to Biometrics – Anil K Jain, Arun A Ross, KarthiNandakumar – Springer
3. Introduction to Machine Learning – MiroslavKubat – Springer
4. Behavioral Biometrics: A remote access approach – Kenneth Revett – Wiley Publications

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**MODEL QUESTION PAPER**

**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre – Ph.D Examination:2022**

**Paper –II: Biometrics with Artificial Intelligence Techniques**

**Time: 3 Hrs**

**Max. Marks: 100**

**Answer all the questions**

**Each question carries 20 Marks**

1. a) Discuss the general working principle of Biometric Authentication systems
- b) What are the applications of Biometric Systems

OR

2. a) Explain the Design cycle of Biometric systems
- b) What are the security and privacy issues faced by biometric systems

3. Explain in detail about levels of Biometric fusion

OR

4. In detail explain about Behavioral Biometrics

5. Discuss in detail about Iris Segmentation

OR

6. Explain the procedure of Iris Normalization

7. Discuss in detail about Bayesian classifier

OR

8. a) What is Induced Classifier's Performance
- b) How to handle Continuous Attributes

9. Discuss the working of Multilayer Perceptrons as Classifiers

OR

10. Explain the working of Decision Trees as Classifiers.

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**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**  
**Pre-Ph.D. Course Work Syllabus**  
**Paper-II: DESIGN AND DEVELOPMENT OF DNA BASED CRYPTOGRAPHIC**  
**TECHNIQUES FOR ENHANCEMENT OF SECURITY AND RELIABILITY**

**Unit I**

**Cryptography and Network Security**

Public key cryptography and RSA: Principles of public key crypto systems, The RSA algorithm Message authentication and hash functions: Authentication requirements, Authentication functions, message authentication codes, Hash functions, security of hash functions and MAC s. Digital Signatures: Digital Signatures, NIST Digital Signature Algorithm. Key Management and Distribution: Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys.

**Unit II**

**Bioinformatics Computer Skills**

Bio Molecular Biology in the Computer Age: How Is Computing Changing Biology?, Building Databases, What Does Informatics Mean to Biologists?, Challenges Does Biology Offer Computer Scientists, Skills for Bioinformatician, Configure a PC to Do Bioinformatics Research Understand Sequence Alignment Data, Program to Align Two Biological Sequences, Prediction of Protein Structure from Sequence. Computational Approaches to Biological Questions: Molecular Biology's Central Dogma, What Biologists Model, Why Biologists Model, Computational Methods, A Computational Biology Experiment

**Unit III**

**DNA Computing**

DNA: Its Structure and Processing: The Structure of DNA, Operations on DNA Molecules, Operations on DNA Molecules, Beginnings of Molecular Computing: Adleman's Experiment, Satisfiability Problem and Break the DES Code, Paradigm of Computing - Some Rethinking, DNA Computing: Hopes and Warnings, Watson-Crick Model. Towards DNA Comparator: The Machine That Compares DNA Concentrations

**Unit IV**

**DNA Computing in Cryptography**

Introduction of DNA Computing in Cryptography, Implementation of Public Key Cryptography in DNA Cryptography, Taxonomy of DNA-Based Security Models, Novel Data Encryption Scheme Using DNA Computing: Introduction, DNA Sequence Operations. A Novel Level-Based DNA Security Algorithm Using DNA Codons: Introduction, Encryption Algorithm, Decryption Algorithm, Algorithm Implementation, Experimental Results, Result Analysis

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## Unit V

### Security and Reliability

Types of Attacks. Taxonomy of Security Attacks in DNA Computing: Introduction, The Significance of Data Security, Security Attacks in DNA Computing: Identity-based security attacks, Non-identity-based security attacks. Security, Privacy, Trust, and Anonymity: Introduction, Security: Confidentiality, Integrity and Availability, Privacy and Trust, Anonymity: Problems with Anonymity, Privacy and Anonymity in DNA Computing

### Text Books:

1. Cryptography and Network Security, William Stallings, Pearson.
2. Developing Bioinformatics Computer Skills, Cynthia Gibas, Per Jambeck, Publisher: O'Reilly.
3. G. Paun G. Rozenberg A. Salomaa DNA Computing New Computing Paradigms, Springer
4. Computational Intelligence and Big Data Analytics, Applications in Bioinformatics. Ch. Satyanarayana, Kunjam Nageswara Rao, Richard G. Bush, Springer
5. Advances of DNA Computing in Cryptography, Suyel Namasudra and Ganesh Chandra Deka. Taylor & Francis Group, CRC Press

### Reference Books:

1. DNA Computing, Ashish Goel Friedrich C. Simmel Petr Sosík (Eds.) Springer
2. Availability, Reliability, and Security in Information Systems, Stephanie Teufel Tjoa A Min Il sun You Edgar Weippl (Eds.) Springer

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(Dr. B. kezla Rani)



**MODEL QUESTION PAPER**

**ADIKAVINANNAYAUNIVERSITY:RAJAMAHENDRAVARAM**

**DEPARTMENT OF COMPUTER SCIENCE&ENGINEERING**

**Pre-Ph.D Examination::2022**

**Paper-II: DESIGN AND DEVELOPMENT OF DNA BASED CRYPTOGRAPHIC  
TECHNIQUES FOR ENHANCEMENT OF SECURITY AND RELIABILITY**

**Time: 3 hrs**

**Max.Marks:100**

**Answer all the questions**

**Each question carried 20 Marks**

- 1.a)Illustrate the RSA Algorithm with an example.  
b) What are the Principles of public key crypto systems? Explain

OR

2.How the Distribution of Public Keys is carried out? Explain.

3.a)How Is Computing Changing Biology? Explain.

b)ExplainComputational Methods in molecular biology.

OR

4.a)Write about Building Databases in Bioinformatics

b)Illustrate Molecular Biology's Central Dogma

5.Discuss about DNA Computing in detail.

OR

6.DemonstrateAdleman's Experiment.

7.Illustrate Implementation of Public Key Cryptography in DNA Cryptography.

OR

8.ExplainDNA Sequence Operations.

9.a)Write about Password Based Attacks.

b) Discuss about The Significance of Data Security.

OR

10.a) Define Security Attacks. Discuss different types of attacks.

b) Discuss about Privacy and Trust in DNA Computing

Scholar Name: Jayamma Rodda

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(Dr. B. Kezia Rani)

**ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre Ph.D Course Work Syllabus**

**Paper II: A NOVEL APPROACH FOR EARLY BREAST CANCER  
DETECTION USING DATA ANALYTICS AND GOLD  
NANOPARTICLES**

**Unit-1 Data Mining:** Data warehousing, Data mining, Classification of Data Mining systems, Data pre-processing: Why data pre-processing is needed, Data Cleaning, Data Integration and Transformation, Data Reduction. Data Warehouse: Data Warehouse and OLAP Technology, Multidimensional Data Model, Data Warehouse Architecture.

**Unit-2 Data Mining Tasks:** Association Analysis: Frequent Itemsets generation using Apriori Algorithm, Evaluation of Association Patterns, Classification: General approach to solving a classification problem, Decision Tree Induction, Clustering: Overview, k-means algorithm.

**Unit-3 Data Types & Collection:** Types of Data: Attributes and Measurement, What is an Attribute? The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Binary Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes, Types of Data Sets, General Characteristics of Data Sets.

**Unit-4 Big Data Analytics:** Big data, convergence of key trends , unstructured data ,industry examples of big data , big data in medicine, Types of digital data, characteristics of data, challenges with big data, definition of big data, big data analytics, data science, technologies in big data environments.

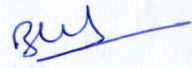
**Unit-5 Introduction to Machine Learning:** Forms of learning, Learning Decision Tree, Statistical learning methods, Supervised learning Linear Models for Regression – Bayesian, Linear Regression, Linear Models for Classification- Decision Trees – Classification Trees, Unsupervised learning Clustering– K-means, Linear regression– Random Forest Algorithm - Machine Learning for Predictive Analytics .

**Textbooks:**

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011.
2. Introduction to Data Mining - First Edition, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc.
4. Han, Jiawei, Jian Pei, and Micheline Kamber, "Data mining: concepts and techniques", 3rd Edition, Elsevier, 2011.
5. Seema Acharya, S. Chellappan, "Big Data and Analytics", Wiley, 2014
6. BIG DATA, Black Book TM, Dream Tech Press, 2015 Edition.

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**MODEL QUESTION PAPER**

**ADIKAVI NANNAYA UNIVERSITY:RAJAMAHENDRAVARAM**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**PRE-PH.D EXAMINATION:: 2022**

**PAPER II: A NOVEL APPROACH FOR EARLY BREAST CANCER  
DETECTION USING DATA ANALYTICS AND GOLD  
NANOPARTICLES**

**Answer all questions**


**Time : 3 hours**

**Max. Marks:100**

**Each question carries 20 Marks**

1. a) What is data mining and Explain the Classification of Data Mining systems.  
b) What is the purpose of Data Preprocessing and Explain Data Cleaning.  
Or
2. a) Write about frequent Itemsets generation using Apriori algorithm.  
b) Explain how to evaluate Association Patterns.
3. a) Explain the general approach to solve a Classification problem.  
b) What is Clustering and Explain K-Means algorithm.  
Or
4. a) What is an attribute and Explain different types of attributes.  
b) Explain the terms: Binary attributes, Normal attributes and Ordinal attributes.
5. a) Explain Discrete versus Continuous attributes.  
b) Describe various types of Datasets and explain their general characteristics.  
Or
6. a) What is Big Data and Explain the industry examples of Big Data.  
b) Explain the role Big data in medicine and explain the challenges of Big Data.
7. a) Explain the characteristics of data and explain the types of digital data.  
b) Discuss about Big Data Analytics and the technologies used in big data environments.  
Or
8. a) Explain the different forms of learning and write about different statistical learning methods.  
b) Explain Linear Regression of Supervised Learning.
9. Explain about Decision Trees and linear models of Classification.  
Or
10. a) Explain K-means clustering method of unsupervised learning.  
b) Explain about Machine Learning for predictive analytics.

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**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre-PhD Coursework Syllabus**

Paper –II: Machine Learning

**Unit 1: Introduction:** Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate, Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

**Unit 2: Neural Network and Genetic Algorithms -** Neural Network Representation – Problems for Neural Network Learning – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics in Neural Networks – Genetic Algorithms – Hypothesis Space Search – Genetic Programming– Models of Evolution and Learning.

**Unit 3: Bayesian and Computational Learning:** Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle –Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probably Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

**Unit 4: Decision Tree and Instance Based Learning:** Decision Tree Representation – Problems for Decision Tree Learning- Basic Decision Tree Algorithm- Hypothesis Space Search- Inductive Bias – Issues in Decision Tree Learning - K- Nearest Neighbor Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

**Unit 5: Dimensionality Reduction:** Need for Dimensionality Reduction, Principal Component Analysis, Singular Value Decomposition, Factor Analysis, User Defined Composites, Locally Linear Embedding, Multidimensional Scaling.

**Text Book**

1. Machine Learning Tom M. Mitchell, McGraw Hill
2. Introduction to Data Mining Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.
3. Data Mining Methods and Models, Daniel T.Larose, Wiley Interscience

**Reference Book**

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

**MODEL QUESTION PAPER**

**ADIKAVI NANNAYA UNIVERSITY  
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

Pre-PhD Examinations  
Paper-II Machine Learning

Time : 3Hrs

Max Marks: 100

Answer all the questions

Each question carries 20 marks

1. (a) Explain the design issues and approached to machine learning. (10)
- (b) Define Concept learning. Explain the tasks in concept learning. (10)

OR

- (c) Explain with example the Candidate-Elimination algorithms. (20)
2. (a) What are the characteristics of problems for which Artificial Neural Networks are well suited? (5)
- (b) Explain the Backpropagation algorithm. (15)
- (c) Explain the Genetic Algorithm (10)
- (d) Explain the models of evolution and learning. (10)
3. (a) State and explain Bayes theorem. How is applied for concept learning. (10)
- (b) Explain the EM algorithm. (10)

OR

- (c) Explain the Probably Approximately Correct learning model. (10)
- (d) Explain the Weighted Majority Algorithm. (10)
4. (a) Illustrate how the (im)purity of training examples is measured. Define and explain with example the measure of effectiveness of an attribute in classifying training data. (8)
- (b) Explain the approaches that can be taken to reduce the problem of overfitting. (12)
- (c) Explain the k-Nearest Neighbor algorithm. (10)
- (d) Explain Locally Weighted Regression. (10)

5. (a) Explain Principal Component Analysis (10)
- (b) Explain with example Factor Analysis (10)

OR

- (c) Explain Locally Linear Embedding algorithm (10)
- (d) Explain Singular Value Decomposition. (10)

**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

Pre-PhD Examinations

Paper-II Information Security

Unit-I Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security, Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography. Modern Block Ciphers: Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4.

Unit-II Introduction to Number theory – Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, GF(2n) Fields, Primes, Primality Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm. Public-key cryptography - Principles of public-key cryptography, RSA Algorithm, Diffie Hellman Key Exchange, ELGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

Unit-III Cryptographic Hash functions: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA) Message Authentication Codes: Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption Digital Signatures- RSA with SHA & DSS

Unit-IV Key Management and distribution: Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure. User Authentication: Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management, Electronic mail security: Pretty Good Privacy (PGP), S/MIME.

Unit-V Security at the Transport Layer(SSL and TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH Security at the Network layer (IPSec): Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange. System Security: Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls

Text books:

1. "Cryptography and Network Security", Behrouz A. Frouzan and Debdeep Mukhopadhyay, McGraw Hill Education, 2nd edition, 2013.
2. "Cryptography and Network Security: Principles and Practice", William Stallings, Pearson Education , Fifth Edition, 2013

**MODEL QUESTION PAPER**  
**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

Pre-PhD Examinations  
Paper-II Information Security

Time : 3Hrs

Max Marks: 100

Answer all the questions

Each question carries 20 marks

1. (a) Explain the OSI Security Architecture. (10)  
(b) What is Substitution Technique? List and explain the different substitution ciphers. (10)  
OR  
(c) Explain the essential features of Feistel cipher. (10)  
(d) Explain the Data Encryption Standard scheme of encryption. (10)
2. (a) With an example explain the working of the Euclidean Algorithm (8)  
(b) Explain the algorithms used for primality testing. (12)  
OR  
(c) Explain the principle of Public Key cryptography. (8)  
(d) Explain Elliptic Curve cryptography. (12)
3. (a) Explain the applications of cryptographic hash functions (8)  
(b) Explain the Secure Hash Algorithm (12)  
OR  
(c) What are the requirements of Message Authentication Code. (10)  
(d) Explain the MAC algorithms based on block ciphers. (10)
4. (a) Explain the format of X.509 certificates. (10)  
(b) Explain the methods of remote user authentication using symmetric encryption. (10)  
OR  
(c) Explain the how key and key rings are organized in PGP (10)  
(d) Explain the security functionalities of S/MIME (10)
5. (a) Explain the types of security threats that are present when using the Web. (8)  
(b) Explain the Secure Socket Layer architecture. (12)  
OR  
(c) Explain the approaches to intrusion detection. (10)  
(d) Explain the different types of firewalls. (10)



**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**Pre-PhD Coursework Syllabus**  
**Paper – II Cloud Computing and Cloud Security**

**UNIT-1: Introduction to Cloud Computing – Introduction. Evolution of Cloud Computing –** Hardware Evolution, Internet Software Evolution, Server Virtualization. Web Services delivered from the Cloud – Communication-as-a-Service, Infrastructure-as-a-Service, Monitoring-as-a-Service, Platform-as-a-Service, Software-as-a-Service. **Cloud Computing Architecture**-Fundamental Cloud Architectures, Advanced Cloud Architectures, Specialized Cloud Architectures.

**UNIT-2: Fundamental Cloud Security-** Basic Terms and Concepts, Threat Agents, Cloud Security Threats, Additional Considerations. **Cloud Computing Software Security Fundamentals –** Cloud Information Security Objective, Cloud Security Service, Relevant Cloud Security Design Principles, Secure Cloud Software Testing. **Cloud Computing Risk Issues -**The CIA Triad, Privacy and Compliance Risks, Threats to Infrastructure, Data, and Access Control, Cloud Access Control Issues, Cloud Service Provider Risks.

**UNIT-3. Cloud Computing Security Challenges -** Security Policy Implementation, Computer Security Incident Response Team (CSIRT), Virtualization Security Management, VM Security Recommendations, VM-Specific Security Techniques. **Infrastructure Security–** Infrastructure Security: The Network Level, Infrastructure Security: The Host Level, Infrastructure Security: The Application Level.

**Unit-4: Cloud Computing Security Architecture-** Architectural Considerations, Identity Management and Access Control, Autonomic Systems, Autonomic Protection, **Data Security and Storage –** Aspects of Data Security, Data Security Mitigation, Provider Data and its Security. **Identity and Access Management –** Trust Boundaries and IAM, IAM Challenges and Definitions, IAM Architecture and Practice, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud.

**UNIT-5: Security Management in the Cloud -** Security Management Standards, Security Management in the Cloud, Availability Management, SaaS Availability Management, PaaS Availability Management, IaaS Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management. **Privacy –** What is privacy, Data Life cycle, Key Privacy concerns in the cloud, Changes to Privacy Risk Management and Compliance in relation to cloud computing.

Reference books:

1. Cloud Computing Implementation, Management, and Security- John W. Rittinghouse, James F. Ransome, CRC Press
2. Cloud Computing Concepts, Technology and Architecture – Thomas Erl, Zaigham Mahmood and Ricardo Puttini, Prentice Hall
3. Cloud Security A Comprehensive Guide to Secure Cloud Computing - Ronald L.Krutz, Russell Dean Vines, Wiley.
4. Cloud security and privacy- An Enterprise perspective on Risks and compliance – Tim Mather, Subra Kumaraswamy, Shahed Latif, O’Riley.

**MODEL QUESTION PAPER**  
**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

Pre-PhD Examinations  
Paper-II Cloud Computing and Cloud Security

Time : 3Hrs

Max Marks: 100

Answer all the questions

Each question carries 20 marks

1. (a) Explain the key characteristics of Cloud Computing. (5)
- (b) Explain with examples the different web services delivered from the cloud. (15)

OR

(c) Explain the features of cloud architectures that can be built upon the fundamental cloud architectures. (20)

2. (a) Explain the common security threats in cloud-based environments. (5 marks)
- (b) List the security design principles and discuss their characteristics. (5)
- (c) Explain the software requirement engineering process to improve cloud software security. (10)

OR

- (d) Explain the techniques used for testing the security of cloud applications (10)
- (e) Discuss the risk factors that exist in general in virtualized systems. (10)
3. (a) (a) Explain the vulnerabilities that are unique to Virtual Machines. (5)
- (b) Explain the security techniques that can be implemented to ensure security in Virtual Machines (15)

OR

(c) Explain the risks and challenges when addressing infrastructure security at the network layer? What are the measures that can be undertaken to mitigate these risks? (15)

(d) Explain the components of PaaS Application Security. (5)

4. (a) Explain the functions of Identity and Access Management. (5)
- (b) Explain the IAM standards for organization for providing user access management process in the cloud. (15)

OR

(c) Explain the parameters that secure cloud communication should ensure? (5)

(d) Explain how secure communication can be established for exchanging data with the cloud. (15)

5. (a) Explain the ITIL service management framework. (10)
- (b) List the factors impacting availability of cloud services. (5)
- (c) What are issues to be addressed when dealing with IaaS availability management? (5)

OR

(d) Explain the data life cycle and its components (10)

(e) Explain the common privacy principles. (10)

**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**Pre-PhD Coursework Syllabus**

**Paper –II Natural Language Processing**

**Unit 1: Introduction:** Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms. **N-grams** - Counting words in Corpora, simple N-grams, Training and Test Sets, Evaluating N-grams, smoothing, Interpolation. **Word Classes and Part-of-Speech Tagging:** English Word Classes, Tag sets for English, Part-of-Speech Tagging, Rule-Based Part-of-Speech Tagging, HMM Part-of-Speech Tagging.

**Unit -2: Hidden Markov Model:** Markov Chains, The Hidden Markov Model, Computing Likelihood: The Forward Algorithm, Decoding: The Viterbi Algorithm, Training HMMs: The Forward-Backward Algorithm. **Information Extraction:** Named Entity Recognition, Ambiguity in Named Entity Recognition, NER as Sequence Labeling, Evaluating Named Entity Recognition, Template –Filling.

**Unit -3: Lexical semantics:** Word Senses, Relation between Senses- Synonymy and Antonymy, Hyponymy Semantic Fields, WordNet: A Database of Lexical Relations, Event Participants: Semantic Roles and Selection Restrictions. **Computational Lexical Semantics:** Word Sense Disambiguation, Supervised Word Sense Disambiguation, WSD: Dictionary and Thesaurus Methods -The Lesk Algorithm, Selectional Restrictions and Selectional Preferences, Semantic Role Labelling.

**Unit -4: Computational Discourse:** Discourse Segmentation - Unsupervised Discourse Segmentation, Supervised Discourse Segmentation, Evaluating Discourse Segmentation, Text Coherence, Reference Resolution, Features for Pronominal Anaphora Resolution, Three algorithms for pronominal anaphora resolution- Pronominal Anaphora Baseline: The Hobbs Algorithm, A Centering Algorithm for Anaphora Resolution, A Log-Linear model for Pronominal Anaphora Resolution.

**Unit – 5: Question Answering and Summarization** Information Retrieval - The Vector Space Model, Term Weighting, Term Selection and Creation, Evaluating Information Retrieval Systems, Homonymy, Polysemy, and Synonymy. Improving User Queries. Summarization- Summarizing Single Documents, Multi-Document Summarization, Content Selection in Multi-Document Summarization, Information Ordering in Multi-Document Summarization.

**Text book:**

1. Daniel Jurafsky and James H. Martin "SPEECH and LANGUAGE PROCESSING An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition" Second Edition.

**Reference books:**

1. Chris Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press. Cambridge, MA: May 1999.
2. Steven Bird, Ewan Klein, and Edward Loper Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit" Second Edition.
3. James Allen "Natural Language Understanding" Pearson; 2nd edition August 3, 1994

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**MODEL QUESTION PAPER**  
**ADIKAVI NANNAYA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
Pre-Ph.D Examination  
Paper –II: Natural Language Processing

Time : 3Hrs

Max Marks: 100

Answer all the questions  
Each question carries 20 marks

1. (a) How are language processing applications different from data processing applications? (5 marks)  
(b) With an example show how the Bigram model be learnt from a given training set. (8 marks)  
(c) What is smoothing? Explain Laplace smoothing algorithm. (7 marks)  
OR  
(d) What is Part-of-Speech tagging? (5marks)  
(e) Explain Hidden Markov Part of Speech Tagging. (15 marks)
2. (a) State the problem of Decoding. Explain the Viterbi algorithm for decoding. (10 marks)  
(b) What is the problem of Computing Likelihood? Explain the Forward Algorithm for computing likelihood. (10 marks)  
OR  
(c) Explain the Forward-Backward algorithm for training HMM. (15 marks)  
(d) Explain the sequence labelling steps for creating an NER system (5 marks)
3. (a) With examples explain the different relationship between word senses. (8 marks)  
(b) Explain the different models of semantic roles. (12 marks)  
OR  
(c) Explain the Semantic Role Labelling algorithm. (10 marks)  
(d) What do you mean by Word Sense Disambiguation? Explain the Lesk algorithm. (10 marks)
4. (a) Explain the TextTiling algorithm for discourse segmentation. (7 marks)  
(b) Define and explain the parameters used for evaluating the performance of discourse segmentation algorithm. (7 marks)  
(c) What is information status? Explain the techniques that can be used to analyse the information status. (6 marks)  
OR  
(d) What is Pronominal Anaphora Resolution? Explain the constraints that can be applied when performing the resolution. (10 marks)  
(e) Explain the Centering algorithm for Anaphora resolution. (10 marks)
5. (a) Explain how the Vector Space Model is applied for information retrieval. (7 marks)  
(b) Explain the tools used for measuring the performance of an information retrieval system. (7 marks)  
(c) What are the methods that can be used to improve the retrieval performance? (6 marks)  
OR  
(d) Explain the essential feature of Centroid-based Summarization algorithms. (5 marks)  
(e) How is the Rhetorical Structure Theory applied for unsupervised summarization. (5 marks)  
(f) What is the main issue that needs attention when summarizing multiple documents? What are the methods to handle it? (5 marks)  
(g) Explain the techniques that can be used for ordering sentences in multi-document summarisation. (5 marks)

*D. Datta*

(12)