

**Progressive Education Society's  
Modern College of Engineering  
Department of Computer Engineering**



# **Curriculum Booklet**

**Fourth Year  
2015 Pattern  
Semester-II**



**Progressive Education Society's**  
**Modern College of Engineering**  
**DEPARTMENT OF COMPUTER ENGINEERING**

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**Progressive Education Society's**  
**Modern College of Engineering, Shivajinagar, Pune-05.**  
**Department of Computer Engineering**

# **Curriculum Booklet**

**2015 Pattern**  
**Semester: II**  
**Class: BE (COMPUTER ENGINEERING)**



**Progressive Education Society's  
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DEPARTMENT OF COMPUTER ENGINEERING**

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**Vision of the Institute:**

- Creation of a collaborative academic environment to foster professional excellence and ethical values.

**Mission of the Institute:**

- To develop outstanding professionals with high ethical standards capable of creating and managing global enterprises.
- To foster innovation and research by providing a stimulating learning environment.
- To ensure equitable development of students of all ability levels and backgrounds.
- To be responsive to changes in technology, socio-economic and environmental conditions.
- To foster and maintain mutually beneficial partnerships with alumni and industry.

**Vision of the Department**

- To achieve excellence in the field of computing through quality education.

**Mission of the Department**

- To develop promising professionals in the field of computing.
- To provide exposure to emerging technologies and inculcate ethics.
- To strengthen association with alumni and industry.



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**Objectives of the Institute:**

- To develop infrastructure appropriate for delivering quality education
- To develop the overall personality of students who will be innovators and future leaders capable of prospering in their work environment.
- To inculcate ethical standards and make students aware of their social responsibilities.
- Promote close interaction among industry, faculty and students to enrich the learning process and enhance career opportunities.
- Encourage faculty in continuous professional growth through quality enhancement programs and research and development activities.
- Foster a healthy work environment which allows for freedom of expression and protection of the rights of all stakeholders through open channels of communication

**PEO**

The graduates of Computer Engineering Department will be,

PEO1: Capable of solving real world problems.

PEO2: Capable of working with multidisciplinary projects.

PEO3: Capable to adapt to changing technologies and life management skills.

PEO4: Able to exhibit professional and ethical responsibilities.

**Program Specific Outcomes**

Graduate of computer engineering programme will demonstrate

- The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.
- The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.
- The ability to solve problems using engineering principles, tools and techniques.



### Program Outcome

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.





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## Course Structure

Faculty of Engineering

Savitribai Phule Pune University

Savitribai Phule Pune University												
Fourth Year of Computer Engineering (2015 Course)												
(with effect from 2018-19)												
<u>Semester II</u>												
Course Code	Course	Teaching Scheme		Examination Scheme and Marks						Credit		
		Hours / Week	Hours / Week	In-Sem	End-Sem	TW	PR	OR/ *PRE	Total	TH/ TUT	PR	
410250	<a href="#">Machine Learning</a>	03	--	30	70	--	--	--	100	03	--	
410251	<a href="#">Information and Cyber Security</a>	03	--	30	70	--	--	--	100	03	--	
410252	<a href="#">Elective III</a>	03	--	30	70	--	--	--	100	03	--	
410253	<a href="#">Elective IV</a>	03	--	30	70	--	--	--	100	03	--	
410254	<a href="#">Laboratory Practice III</a>	--	04	--	--	50	50	--	100	--	02	
410255	<a href="#">Laboratory Practice IV</a>	--	04	--	--	50	--	*50	100	--	02	
410256	<a href="#">Project Work Stage II</a>	--	06	--	--	100	--	*50	150	--	06	
				<b>Total</b>						<b>Credit</b>	<b>12</b>	<b>10</b>
<b>Total</b>		<b>12</b>	<b>14</b>	<b>120</b>	<b>280</b>	<b>200</b>	<b>50</b>	<b>100</b>	<b>750</b>	<b>22</b>		
410257	<a href="#">Audit Course 6</a>										<b>Grade</b>	
<b>Elective III</b>						<b>Elective IV</b>						
410252 (A) <a href="#">Advanced Digital Signal Processing</a>						410253 (A) <a href="#">Software Defined Networks</a>						
410252 (B) <a href="#">Compilers</a>						410253 (B) <a href="#">Human Computer Interface</a>						
410252 (C) <a href="#">Embedded and Real Time Operating Systems</a>						410253 (C) <a href="#">Cloud Computing</a>						
410252 (D) <a href="#">Soft Computing and Optimization Algorithms</a>						410253 (D) <a href="#">Open Elective</a>						

**410259-Audit Course 6 (AC6) Options:**

**AC6-I:** [Business Intelligence](#)

**AC6-IV:** [Usability Engineering](#)

**AC6-II:** [Gamification](#)

**AC6-V:** [Conversational Interfaces](#)

**AC6-III:** [Quantum Computing](#)

**AC6-VI:** [MOOC- Learn New Skills](#)

**Abbreviations:**

**TW:** Term Work      **TH:** Theory      **OR:** Oral      **PR:** Practical

**Sem:** Semester      **\*PRE:** Project/ Mini-Project Presentation



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**Subject – Machine Learning**

<b>Weekly Work Load(in Hrs)</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>
	<b>04</b>	<b>-</b>	<b>04</b>

<b>Online/ In-sem</b>	<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term-work</b>	<b>Total Marks</b>	<b>Credit</b>
<b>ML</b>	<b>30+70</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	
<b>ICS</b>	<b>30+70</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	
<b>LP3</b>	<b>-</b>	<b>50</b>		<b>50</b>	<b>100</b>	

**Course Objective**

1. To understand the problem and apply machine learning algorithm.
2. To understand various types of supervised machine learning.
3. To understand various types of unsupervised machine learning.
4. To understand Meta classifiers and deep learning concepts.

**Course Outcomes**

C410.1 Apply preprocessing methods to prepare training data set for machine learning.

C410.2 Apply regression techniques to evaluate and interpret the results of the various regression algorithms.

C410.3 Choose and apply supervised machine learning algorithms for real world applications.

C410.4 Solve problems using clustering techniques.



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**Syllabus**

<b>Unit</b>	<b>Course Contents</b>	<b>Hours</b>
<b>I</b>	<b>Introduction to Machine learning</b>	<b>08</b>
	Classic and adaptive machines, Machine learning matters, Beyond machine learning-deep learning and bio inspired adaptive systems, Machine learning and Big data. Important Elements of Machine Learning- Data formats, Learnability, Statistical learning approaches, Elements of information theory.	
<b>II</b>	<b>Feature Selection</b>	<b>08</b>
	Scikit- learn Dataset, Creating training and test sets, managing categorical data, Managing missing features, Data scaling and normalization, Feature selection and Filtering, Principle Component Analysis(PCA)-non negative matrix factorization, Sparse PCA, Kernel PCA. Atom Extraction and Dictionary Learning.	
<b>III</b>	<b>Regression</b>	<b>08</b>
	<b>Linear regression-</b> Linear models, A bi-dimensional example, Linear Regression and higher dimensionality, Ridge, Lasso and ElasticNet, Robust regression with random sample consensus, Polynomial regression, Isotonic regression, <b>Logistic regression-</b> Linear classification, Logistic regression, Implementation and Optimizations, Stochastic gradient descent algorithms, Finding the optimal hyper-parameters through grid search, Classification metric, ROC Curve.	
<b>IV</b>	<b>Naïve Bayes and Support Vector Machine</b>	<b>08</b>
	Bayes'' Theorem, Naïve Bayes'' Classifiers, Naïve Bayes in Scikit- learn- Bernoulli Naïve Bayes, Multinomial Naïve Bayes, and Gaussian Naïve Bayes. Support Vector Machine (SVM)- Linear Support Vector Machines, Scikit- learn implementation- Linear Classification, Kernel based classification, Non-linear Examples. Controlled Support Vector Machines, Support Vector Regression.	
<b>V</b>	<b>Decision Trees and Ensemble Learning</b>	<b>08</b>
	<b>Decision Trees-</b> Impurity measures, Feature Importance. Decision Tree Classification with Scikit-learn, Ensemble Learning-Random Forest, AdaBoost, Gradient Tree Boosting, Voting Classifier. <b>Clustering Fundamentals-</b> Basics, K-means: Finding optimal number of clusters, DBSCAN, Spectral Clustering. Evaluation methods based on Ground Truth- Homogeneity, Completeness, Adjusted Rand Index. <b>Introduction to Meta Classifier:</b> Concepts of Weak and eager learner, Ensemble methods, Bagging, Boosting, Random Forests.	





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<b>VI</b>	<b>Clustering Techniques</b>	<b>08</b>
	<p>Hierarchical Clustering, Expectation maximization clustering, Agglomerative Clustering- Dendrograms, Agglomerative clustering in Scikit- learn, Connectivity Constraints.</p> <p><b>Introduction to Recommendation Systems-</b> Naïve User based systems, Content based Systems, Model free collaborative filtering-singular value decomposition, alternating least squares.</p> <p><b>Fundamentals of Deep Networks-</b>Defining Deep learning, common architectural principles of deep networks, building blocks of deep networks.</p>	



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**Text Books**

<b>Sr.No</b>		<b>Text Books</b>
<b>1</b>	<b>T1</b>	Giuseppe Bonaccorso, "Machine Learning Algorithms", Packt Publishing Limited, ISBN-10: 1785889621, ISBN-13: 978-1785889622
<b>2</b>	<b>T2</b>	Josh Patterson, Adam Gibson, "Deep Learning: A Practitioners Approach", O'REILLY, SPD, ISBN: 978-93-5213-604-9, 2017 Edition 1st.

**Reference Books**

<b>Sr.No</b>		<b>Reference Books</b>
<b>1</b>	<b>R1</b>	Ethem Alpaydin, " Introduction to Machine Learning", PHI 2nd Edition-2013, ISBN 978-0-262-01243-0
<b>2</b>	<b>R2</b>	Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", Cambridge University Press, Edition 2012, ISBN-10: 1107422221; ISBN-13: 978-1107422223
<b>3</b>	<b>R3</b>	Tom Mitchell "Machine Learning" McGraw Hill Publication, ISBN : 0070428077 9780070428072
<b>4</b>	<b>R4</b>	Nikhil Buduma, "Fundamentals of Deep Learning", O'REILLY publication, second edition 2017, ISBN: 1491925612



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**Teaching Plan**

<b>Sr. No.</b>	<b>Unit</b>	<b>Broad Topic to be covered</b>	<b>Books Referred</b>	<b>Total Lectures Planned</b>
1	I	Introduction to Machine learning	T1, T2, R3	8
2	II	Feature Selection	T1, T2, R3	8
3	III	Regression	T1, T2, R3	8
4	IV	Naïve Bayes and Support Vector Machine	T2, R3	8
5	V	Decision Trees and Ensemble Learning	T2, R3	8
6	VI	Clustering Techniques	T2, R3	8



### Question Bank

#### UNIT I. Introduction to Machine learning

1. Explain the concept of adaptive machines with reference to machine learning,
2. What does Machine learning exactly mean? Explain Application of Machine Learning for data scientists.
3. How machine Learning works for Big data applications?
4. "Explain how machine learning works for the following common un-supervised learning applications:
  - I. Object segmentation (for example, users, products, movies, songs, and so on)
  - II. Similarity detection
  - III. Automatic labeling
5. Explain the Overfitting, and underfitting with reference to Machine Learning.
6. "Explain how machine learning works for the following common deep learning applications:
  - I. Image classification
  - II. Real-time visual tracking
  - III. Autonomous car driving
7. Explain data formats and learnability with reference to Machine Learning
8. Explain how machine learning works for the following common deep learning applications:
  - I. Logistic optimization
  - II. Bioinformatics
  - III. Speech recognition
9. Explain the technique clustering with reference to unsupervised learning.
10. Explain the technique classification and regression with reference to supervised learning.

#### UNIT II. Feature Selection

1. "Justify the statement: Feature engineering is the first step in a machine learning pipeline and involves all the techniques adopted to clean existing datasets."
2. How categorical data are Managed in various classification problems?
3. Explain the process of Creating training and test sets for Iris Dataset.
4. Write a short note on Sparse PCA and Kernel PCA
5. "Justify the statement: Feature engineering is the first step in a machine learning pipeline and involves all the techniques to reduce Features dimensionality."
6. What is effect of raw data on feature engineering process?
7. "Justify the statement: Feature engineering is the first step in a machine learning pipeline and involves all the techniques adopted to increase their signal-noise ratio."
8. What is effect of unnormalized dataset in feature engineering?
9. What is dictionary learning?
10. Write a short note on Singular Value Decomposition.

#### UNIT III. Regression

1. Explain linear classification algorithm with example.



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2. What is significance of ROC curve with reference to logistic regression?
3. Compare linear and logistic regression?
4. Explain the following types of regression with Examples.
  1. Ridge
  2. Lasso
  3. ElasticNet.
5. Explain a bidimensional example for linear regression.
6. What is significance of Stochastic gradient descent algorithms in logistic regression?
7. Explain how Linear regression for higher dimensionality of data?
8. What do you mean by linearly and non-linearly separable data?
9. What are classification metrics?
10. What applications are suitable for Isotonic regression?

**UNIT – IV. Naïve Bayes and Support Vector Machine**

1. What is probabilistic model? Give an example of it.
2. Explain one dimensional and N-dimensional Gaussian mixture model.
3. Write a note on multi nominal distribution.
4. Consider the following three – class confusion matrix

Predicted			
Actual	15	2	3
	7	15	8
	2	3	45

- Calculate precision and recall per class. Also calculate weighted average precision and recall for the classifier.
5. Define:
    - a. Bernoulli's distribution
    - b. Binomial distribution
    - c. MAP decision rule
    - d. Maximum likelihood function
  6. Write note on Naïve Bayes Classification algorithm.
  7. Derive and explain output code matrix for One vs One and One vs Rest scheme for construction of Multi class classifier (for 3 classes)
  8. What are support vectors and margins? Also explain soft margin SVM
  9. Explain kernel methods of nonlinearity
  10. Explain support vector machine
  11. Explain Naïve Bayes Classification. Algorithm.
  12. Define the terms:
    - a. Bernoulli's Distribution
    - b. Binomial distribution
    - c. Multinomial distribution
    - d. Gaussian distribution
  13. What is a support vector? How the margins are defined in support vector machine.
  14. Define and explain:
    - a. Bernoulli's distribution
    - b. Binomial distribution
  15. Write and Explain Naïve Bayes Classification. Algorithm.



16. Approximately 1% of population among the age group of 40-50 has diabetes. A person with diabetes has a 90% of chance of a positive test, while a person without diabetes have 9% of chance of false positive result. What is the probability that a person has diabetes given that she just had a positive test?

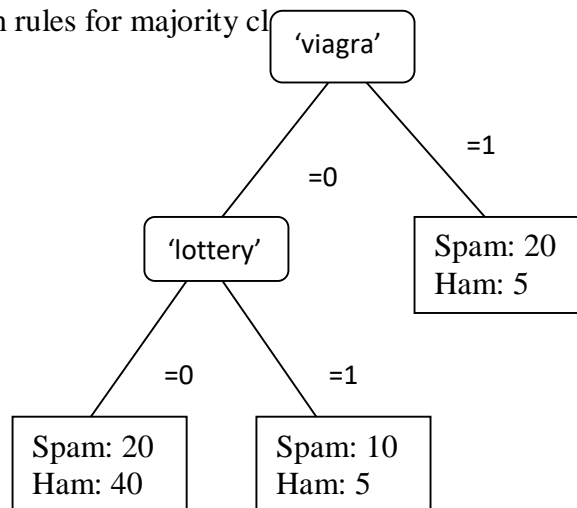
**UNIT – V. Decision Trees and Ensemble Learning**

Consider following dataset

X1	X2	Y
2	1	4
6	3	2
2	5	2
6	7	3
10	7	3
4	4	2
7	6	3

Model this function using the K-nearest neighbor regression. What will be the value of Y for the instance  $(X_1, X_2) = (4, 5)$  and  $K=3$ .

1. How empirical probabilities can be used in ranking and probability estimation. Explain the purpose of pruning the subtree of a decision tree.
2. Explain random forest method.
3. What is majority classes decision rule? Using following feature tree, write decision rules for majority class



4. Explain with the help of diagrams and equations Minkowski, Euclidean, Manhattan and Hamming distances.
5. What is a feature tree? Writ the Grow Tree algorithm to generate feature tree. Explain the role of best split in this algorithm.
6. Explain bagging and boosting as ensemble methods.
7. Find all 3 – item itemsets from this set with minimum support=2



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T1	{K,A,D,B}
T2	{D,A,C,E,B}
T3	{C,A,B,E}
T4	{B,A,D}

8. Write K-means algorithm.
9. Explain Ensemble learning.
10. Define cluster Tree? Write and explain Agglomerative Clustering algorithm.
11. A Survey is conducted on two attributes. 'Acid Durability(secs)' and 'Strength(kg/m<sup>2</sup>)' to classify whether a special paper tissue is 'good' or not. Following are the samples received.

Sr. No.	Acid Durability	Strength(kg/m <sup>2</sup> )	Target Class
1	7	7	Bad
2	7	4	Bad
2	7	4	Bad
3	3	4	Good
4	1	4	Good
5	2	5	Good

If a particular sample is surveyed with 'Acid Durability'=3 seconds and 'Strength=7 kg/m<sup>2</sup>', then what will be its target class if value of k =2 and k=?

12. Explain multi task learning with Task grouping and overlap methodology

**UNIT – VI. Clustering Techniques**

1. Write a note on Deep learning and its applications.
2. Explain perceptron training algorithm for linear classification.
3. Explain silhouettes.
4. Discuss various distance measures.
5. Write a note on compression based models.
6. Explain deep learning. What are the challenges in Deep learning?
7. Can decision trees be used for performing clustering? How?
8. What is the minimum number of variable/features required to perform clustering?
9. How can cluster (unsupervised learning) be used to improve the accuracy of linear regression model (supervised learning)?
10. Classify the filter techniques in recommender system.
11. Explain common architectural principles in deep networks.
12. Write short note on knowledge based recommendation system.
13. Explain high level architecture of Content based system.
14. Write algorithm on K-means clustering. Describe its working in brief using example.





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**Subject –Information and Cyber Security**

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	04	-	-

Online/ In-sem	Theory	Practical	Oral	Term-work	Total Marks	Credit
30	70	-	-	-	100	3

**Course Objectives:**

1. To offer an understanding of principle concepts, central topics and basic approaches in information and cyber security.
2. To know the basics of cryptography.
3. To acquire knowledge of standard algorithms and protocols employed to provide confidentiality, integrity and authenticity.
4. To enhance awareness about Personally Identifiable Information (PII), Information Management, cyber forensics.

**Course Outcomes:**

C411.1 Apply data encryption techniques for system level security.

C411.2 Apply various Public key cryptographic techniques.

C411.3 Evaluate various cryptography measures to ensure privacy & confidentiality.

C411.4 Identify network and cyber security threats and related laws.

**Syllabus**



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<b>Unit</b>	<b><u>Course Contents</u></b>	<b><u>Hours</u></b>
<b>I</b>	<b>Security Basics</b>	<b>08</b>
	Introduction, Elements of Information Security, Security Policy, Techniques, Steps, Categories, Operational Model of Network Security, Basic Terminologies in Network Security. Threats and Vulnerability, Difference between Security and Privacy.	
<b>II</b>	<b>Data Encryption Techniques And Standards</b>	<b>08</b>
	Introduction, Encryption Methods: Symmetric, Asymmetric, Cryptography, Substitution Ciphers. Transposition Ciphers, Stenography applications and limitations, Block Ciphers and methods of operations, Feistel Cipher, Data Encryption Standard (DES), Triple DES, DES Design Criteria, Weak Keys in DES Algorithms, Advance Encryption Standard (AES).	
<b>III</b>	<b>Public Key And Management</b>	<b>08</b>
	Public Key Cryptography, RSA Algorithm: Working, Key length, Security, Key Distribution, Deffie-Hellman Key Exchange, Elliptic Curve: Arithmetic, Cryptography, Security, Authentication methods, Message Digest, Kerberos, X.509 Authentication service. Digital Signatures: Implementation, Algorithms, Standards (DSS), Authentication Protocol.	
<b>IV</b>	<b>Security Requirements</b>	<b>08</b>
	IP Security: Introduction, Architecture, IPV6, IPv4, IPSec protocols, and Operations, AH Protocol, ESP Protocol, ISAKMP Protocol, Oakkey determination Protocol, VPN. WEB Security: Introduction, Secure Socket Layer (SSL), SSL Session and Connection, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, Handshake Protocol. Electronic Mail Security: Introduction, Pretty Good Privacy, MIME, S/MIME, Comparison. Secure Electronic Transaction (SET).	
<b>V</b>	<b>Firewall And Intrusion</b>	<b>08</b>
	Introduction, Computer Intrusions. Firewall Introduction, Characteristics and types, Benefits and limitations. Firewall architecture, Trusted Systems, Access Control. Intrusion detection, IDS: Need, Methods, Types of IDS, Password Management, Limitations and Challenges.	
<b>VI</b>	<b>Confidentiality And Cyber Forensic</b>	<b>08</b>
	Introduction to Personally Identifiable Information (PII), Cyber Stalking, PII impact levels with examples Cyber Stalking, Cybercrime, PII Confidentiality Safeguards, Information Protection Law: Indian Perspective.	



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**Text Books**

Sr.No		Text Books
1	T1	Bernard Menezes, "Network Security and Cryptography", Cengage Learning India, 2014, ISBN No.: 8131513491
2	T2	Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, 2014, ISBN No.: 978-81- 345-2179-1

**Reference Books**

Sr.No		Reference Books
1	R1	Eoghan Casey, "Digital Evidence and Computer Crime Forensic Science, Computers and the Internet", ELSEVIER, 2011, ISBN 978-0-12-374268-1
2	R2	Atul Kahate, "Cryptography and Network Security", Mc Graw Hill Publication, 2nd Edition, 2008, ISBN : 978-0-07-064823-4
3	R3	William Stallings, "Cryptography and network security principles and practices", Pearson, 6th Edition, ISBN : 978-93-325-1877-3
4	R4	Forouzan, "Cryptography and Network Security (SIE)", Mc Graw Hill, ISBN, 007070208X, 9780070702080
5	R5	Dr. Nilakshi Jain-Digital Forensic: The Fascinating World of Digital Evidences-Wiley India-ISBN: 9788126565740

**Teaching Plan**

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures Planned
1	I	Security Basics	T1, T2, R3	8
2	II	Data Encryption Techniques And Standards	T1, T2, R3	8
3	III	Public Key And Management	T1, T2, R3	8
4	IV	Security Requirements	T2, R3	8
5	V	Firewall And Intrusion	T2, R3	8
6	VI	Confidentiality And Cyber Forensic	T2, R3	8



### Question Bank

This set of Cryptography Multiple Choice Questions & Answers (MCQs) focuses on “Symmetric Cipher Models and Elementary Number Theory”.

1. In brute force attack, on average half of all possible keys must be tried to achieve success.
- True
  - False

View Answer: a

Explanation: In brute force attack the attacker tries every possible key on a piece of cipher-text until an intelligible translation into plaintext is obtained.

2. If the sender and receiver use different keys, the system is referred to as conventional cipher system.
- True
  - False

3. Divide (HAPPY)<sub>26</sub> by (SAD)<sub>26</sub>. We get quotient –
- KD
  - LD
  - JC
  - MC

View Answer

Answer: a

Explanation: Dividing (HAPPY)<sub>26</sub> by (SAD)<sub>26</sub> gives us KD with a remainder MLP.

4. Dividing (11001001) by (100111) gives remainder –
- 11
  - 111
  - 101
  - 110

View Answer

Answer: d

Explanation: Dividing (11001001) by (100111) gives us (110).

5. pi in terms of base 26 is
- C.DRS
  - D.SQR
  - D.DRS



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d) D.DSS

[View Answer](#)

Answer: c

Explanation: On converting using base conversions we get 3.1415926 as D.DRS.

6. The time required to convert a k-bit integer to its representation in the base 10 in terms of big-O notation is

- a)  $O(\log_2 n)$
- b)  $O(\log n)$
- c)  $O(\log_2 2n)$
- d)  $O(2\log n)$

[View Answer:](#)

Answer: a

Explanation: Let  $n$  be a k-bit integer in binary. The conversion algorithm is as follows. Divide  $10 = (1010)$  into  $n$ . The remainder – which will be one of the integers 0, 1, 10, 11, 100, 101, 110, 111, 1000, or 1001 – will be the ones digit  $d_0$ . Now replace  $n$  by the quotient and repeat the process, dividing that quotient by  $(1010)$ , using the remainder as  $d_1$  and the quotient as the next number into which to divide  $(1010)$ . This process must be repeated a number of times equal to the number of decimal digits in  $n$ , which is  $\lceil \log n / \log 10 \rceil + 1 = O(k)$ . We have  $O(k)$  divisions, each requiring  $O(4k)$  operations (dividing a number with at most  $k$  bits by the 4 bit number  $(1010)$ ). But  $O(4k)$  is the same as  $O(k)$  (constant factors don't matter in the big-O notation, so we conclude that the total number of bit operations is  $O(k)$ .  $O(k) = O(k^2)$ . If we want to express this in terms of  $n$  rather than  $k$ , then since  $k = O(\log n)$ , we can write  $\text{Time}(\text{convert } n \text{ to decimal}) = O(\log_2 n)$ .

7. In base 26, multiplication of YES by NO gives –

- a) THWOE
- b) MPAHT
- c) MPJNS
- d) THWAE

[View Answer](#)

Answer: c

Explanation: Convert the alphabets into their respective values in base 26 and proceed with base 26 multiplications.

8. Division of  $(131B6C3)$  base 16 by  $(1A2F)$  base 16 yeilds –

- a) 1AD
- b) DAD
- c) BAD
- d) 9AD

[View Answer](#)



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Answer: d

Explanation: Base 16 division to be followed where A-F stand for 10-15.

9. An encryption scheme is unconditionally secure if the ciphertext generated does not contain enough information to determine uniquely the corresponding plaintext, no matter how much cipher text is available.

- a) True
- b) False

View Answer:

Answer: a

Explanation: The above statement is the definition for unconditionally secure cipher systems.

10. The estimated computations required to crack a password of 6 characters from the 26 letter alphabet is-

- a) 308915776
- b) 11881376
- c) 456976
- d) 8031810176

View Answer

Answer: a

Explanation: The required answer is  $26^6 = 308915776$ .

11. Reduce the following big-O notations:

$O[ax^7 +$

$3x^3 +$

$\sin(x)] =$

advertise

met

- a)  $O[ax^7]$ .
- b)  $O[\sin(x)]$ .
- c)  $O[x^7]$ .
- d)  $O[x^7 + x^3]$ .

View Answer

Answer: c

Explanation:  $O[ax^7 + 3x^3 + \sin(x)] = O(ax^7) = O(x^7)$



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12. Reduce the following big-O notations:

$$O [ n! + n^{50} ] =$$

- a)  $O [ n! + n^{50} ]$ .
- b)  $O [ n! ]$ .
- c)  $O [ n^{50} ]$ .
- d) None of the Mentioned

View Answer :

Answer: b

Explanation:  $O [ n! + n^{50} ] = O [ n! ]$ .

This set of Cryptography Multiple Choice Questions & Answers (MCQs) focuses on “The Data Encryption Standard (DES) and It’s Strength”.

1. DES follows
- a) Hash Algorithm
  - b) Caesars Cipher
  - c) Feistel Cipher Structure
  - d) SP Networks

View Answer

Answer: c

Explanation: DES follows Feistel Cipher Structure.

2. The DES Algorithm Cipher System consists of

\_\_rounds (iterations) each with a round key

- a) 12
- b) 18
- c) 9
- d) 16

View Answer

Answer: d

Explanation: The DES Algorithm Cipher System consists of 16 rounds (iterations) each with a round key.

3. The DES algorithm has a key length of

- a) 128 Bits
- b) 32 Bits





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- c) 64 Bits
- d) 16 Bits

View Answer:

Answer: c

Explanation: DES encrypts blocks of 64 bits using a 64 bit key.

4. In the DES algorithm, although the key size is 64 bits only 48bits are used for the encryption procedure, the rest are parity bits.

- a) True
- b) False

View Answer:

Answer: b

Explanation: 56 bits are used, the rest 8 bits are parity bits.

5. In the DES algorithm the round key is \_\_\_\_\_ bit and the Round Input is \_\_\_\_\_ bits. a) 48, 32

- b) 64,32
- c) 56, 24
- d) 32, 32

View Answer

Answer: a

Explanation: The round key is 48 bits. The input is 32 bits.

6. In the DES algorithm the Round Input is 32 bits, which is expanded to 48 bits via

- 
- a) Scaling of the existing bits
- b) Duplication of the existing bits
- c) Addition of zeros
- d) Addition of ones

View Answer

Answer: a

Explanation: The round key is 48 bits. The input is 32 bits. This input is first expanded to 48 bits (permutation plus an expansion), that involves duplication of 16 of the bits.

7. The Initial Permutation table/matrix is of size

- a) 16×8
- b) 12×8
- c) 8×8
- d) 4×8



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[View Answer](#)

Answer: c

Explanation: There are 64 bits to permute and this requires a  $8 \times 8$  matrix.

[Advertisement](#)

8. The number of unique substitution boxes in DES after the 48 bit XOR operation are

- a) 8
- b) 4
- c) 6
- d) 12

[View Answer](#)

Answer: a

Explanation: The substitution consists of a set of 8 S-boxes, each of which accepts 6 bits as input and produces 4 bits as output.



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**Name of the Subject- Compilers**

<b>Weekly Work Load (in Hrs)</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>
	<b>3</b>	-	-

<b>In-Sem</b>	<b>Theory</b>	<b>Total Marks</b>	<b>Credit</b>
<b>30</b>	<b>70</b>	<b>100</b>	<b>3</b>

**Course Objectives**

1. To introduce process of compilation.
2. To introduce compiler writing tools.
3. To address issues in code generation and optimization.

**Course Outcomes**

C412B.1 Make use of LEX and YACC to construct scanner and parser.

C412B.2 Construct various types of grammar and Apply it for intermediate code generation.

C412B.3 Apply translation for control structures of high level language.

C412B.4 Apply code generation and code optimization techniques for the given code.



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**Syllabus:**

<b>Unit</b>	<b><u>Course Contents</u></b>	<b><u>Hours</u></b>
<b>I</b>	<b><u>Introduction to compilers</u></b>	<b>08</b>
	Introduction to compilers Design issues, passes, phases, symbol table Preliminaries Memory management, Operating system support for compiler, Lexical Analysis Tokens, Regular Expressions, Process of Lexical analysis, Block Schematic, Automatic construction of lexical analyzer using LEX, LEX features and specification.	
<b>II</b>	<b><u>Parsing</u></b>	<b>08</b>
	Syntax Analysis CFG, top-down and bottom-up parsers, RDP, Predictive parser, SLR, LR(1), LALR parsers, using ambiguous grammar, Error detection and recovery, automatic construction of parsers using YACC, Introduction to Semantic analysis, Need of semantic analysis, type checking and type conversion	
<b>III</b>	<b><u>Syntax Translation Scheme</u></b>	<b>08</b>
	Syntax Directed Translation - Attribute grammar, S and L attributed grammar, bottom up and top down evaluations of S and L attributed grammar, Syntax directed translation scheme, Intermediate code - need, types: Syntax Trees, DAG, Three-Address codes: Quadruples, Triples and Indirect Triples, Intermediate code generation of declaration statement and assignment statement.	
<b>IV</b>	<b><u>Run-time Storage Management</u></b>	<b>08</b>
	Storage Management – Static, Stack and Heap, Activation Record, static and control links, parameter passing, return value, passing array and variable number of arguments, Static and Dynamic scope, Dangling Pointers, translation of control structures – if, if-else statement, Switch case, while, do -while statements, for, nested blocks, display mechanism, array assignment, pointers, function call and return. Translation of OO constructs: Class, members and Methods.	
<b>V</b>	<b><u>Code Generation</u></b>	<b>08</b>
	Code Generation - Issues in code generation, basic blocks, flow graphs, DAG representation of basic blocks, Target machine description, peephole optimization, Register allocation and Assignment, Simple code generator, Code generation from labeled tree, Concept of code generator	
<b>VI</b>	<b><u>Code Optimization</u></b>	<b>08</b>



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	Need for Optimization, local, global and loop optimization, Optimizing transformations, compile time evaluation, common sub-expression elimination, variable propagation, code movement, strength reduction, dead code elimination, DAG based local optimization, Introduction to global data flow analysis, Data flow equations and iterative data flow analysis.	
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**Books:**

**Text:**

**T1:** V Aho, R Sethi, J D Ullman, "Compilers: Principles, Techniques, and Tools", Pearson Edition, ISBN 81-7758-590-8 .

**T2:** Dick Grune, Bal, Jacobs, Langendoen, "Modern Compiler Design", Wiley, ISBN 81-2650418-8

**References:**

**R1:** Anthony J. Dos Reis, "Compiler Construction Using Java", JavaCC and Yacc Wiley, ISBN 978-0-470-94959-7

**R2:** K Muneeswaran, "Compiler Design", Oxford University press, ISBN 0-19-806664-3 3. J R Levin, T Mason, D Brown, "Lex and Yacc", O'Reilly, 2000 ISBN 81-7366-061-X



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**Teaching Plan**

<b>Sr. No.</b>	<b>Unit</b>	<b>Broad Topic to be covered</b>	<b>Books Referred</b>	<b>Total Lectures Planned</b>
1	I :	Notion and Concepts	T1,R1,R2	08
2	II :	Parsing	T1,R1,R2	08
3	III :	Syntax Translation Schemes	T1,R1	08
4	IV :	Run-time Storage Management	T1,R2	08
5	V :	Code Generation	T1,T2,R2	08
6	VI :	Code Optimization	T1,T2,R2	08



## Question Bank

### UNIT 1

1. What is Compiler? Design the Analysis and Synthesis Model of Compiler.
2. Write down the five properties of compiler.
3. What is translator? Write down the steps to execute a program.
4. Discuss all the phases of compiler with a with a diagram.
5. Write a short note on:
  - a. YACC
  - b. Pass
  - c. Bootstrapping
  - d. LEX Compiler
  - e. Tokens, Patterns and Lexemes
  
6. What is Regular Expression? Write the regular expression for:
  - a.  $R=R_1+R_2$  (Union operation)
  - b.  $R=R_1.R_2$  (concatenation Operation)
  - c.  $R=R_1^*$  (Kleen Clouser)
  - d.  $R=R^+$  (Positive Clouser)
  - e. Write a regular expression for a language containing strings which end with “abb” over  $\Sigma = \{a,b\}$ .
  - f. Construct a regular expression for the language containing all strings having any number of a's and b's except the null string.
  
7. Derivation and Parse Tree:
  - a. Let G be a Context Free Grammar for which the production Rules are given below:  
 $S \rightarrow aB|bA$   
 $A \rightarrow a|aS|bAA$   
 $B \rightarrow b|bS|aBB$   
Drive the string *aaabbabbba* using the above grammar (using Left Most Derivation and Right most Derivation).

### UNIT 2

1. Explain the parsing techniques with a hierarchical diagram.
2. What are the problems associated with Top Down Parsing?
3. Write the production rules to eliminate the left recursion and left factoring problems.
4. Consider the following Grammar:

$A \rightarrow ABd|Aa|a$

$B \rightarrow Be|b$

Remove left recursion.

8. Do left factoring in the following grammar:





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A → aAB|aA|a

B → bB|b

6. Write a short note on:

a. Ambiguity (with example)

b. Recursive Descent Parser

c. Predictive LL(1) parser (working)

d. Handle pruning

e. Operator Precedence Parser

7. Write Rules to construct FIRST Function and FOLLOW Function.

8. Consider Grammar:

E → E+T|T

T → T\*F|F

F → I|id

9. Write the algorithm to create Predictive parsing table with the scanning of input string.

10. Show the following Grammar:

S → AaAb|BbBa

A → ε

B → ε

Is LL(1) and parse the input string "ba".

11. Consider the grammar:

E → E+E

E → E\*E

E → id

Perform shift reduce parsing of the input string "id1+id2+id3".

12. Write the properties of LR parser with its structure. Also explain the techniques of LR parser.

13. Write a short note on:

a. Augmented grammar

b. Kernel items

c. Rules of closure operation and goto operation

d. Rules to construct the LR(0) items

14. Consider the following grammar:

S → Aa|bAc|Bc|bBa

A → d

B → d

Compute closure and goto.

15. Write the rules to construct the SLR parsing table.

16. Consider the following grammar:

E → E+T|T



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T → TF|F

F → F\*|a|b

Construct the SLR parsing table and also parse the input “a\*b+a”

17. Write the rules to construct the LR(1) items.

18. What is LALR parser? Construct the set of LR(1) items for this grammar:

S → CC

C → aC

C → d

19. Show the following grammar

S → Aa|bAc|Bc|bBa

A → d

B → d

Is LR(1) but not LALR(1).

20. Write the comparison among SLR Parser, LALR parser and Canonical LR Parser.

### UNIT 3

1. What is syntax directed translation (SDD)?

2. Write short note on:

a. Synthesized attributes

b. Inherited attributes

c. Dependency graph

d. Evaluation order

e. Directed Acyclic Graph (DAG)

3. Draw the syntax tree and DAG for the following expression:

$(a*b)+(c-d)*(a*b)+b$

4. Differentiate between synthesized translation and inherited translation.

5. What is intermediate code and write the two benefits of intermediate code generation.

6. Write the short note on:

a. Abstract syntax tree

b. Polish notation

c. Three address code

d. Backpatching

7. Construct syntax tree and postfix notation for the following expression:  $(a+(b*c)^d-e)/(f+g)$

8. Write quadruples, triples and indirect triples for the expression:

$-(a*b)+(c+d)-(a+b+c+d)$

9. Write the three address statement with example for:

a. Assignment

b. Unconditional jump (goto)

c. Array statement (2D and 3D)



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- d. Boolean expression
- e. If-then-else statement
- f. While, do-while statement
- g. Switch case statement

**UNIT 4**

1. Write the definition of symbol table and procedure to store the names in symbol table.
2. What are the data structures used in symbol table?
3. What are the limitations of stack allocation?
4. Write two important points about heap management.
5. Write the comparison among Static allocation, Stack allocation and Heap Allocation with their merits and limitations.
6. What is activation record? Write the various fields of Activation Record.
7. What are the functions of error handler?
8. Write a short note on Error Detection and Recovery.
9. Classify the errors and discuss the errors in each phase of Compiler.

**UNIT 5**

1. What are the properties of code generation phase? Also explain the Design Issues of this phase.
2. What are basic blocks? Write the algorithm for partitioning into Blocks.
3. Write a short note on:
  - a. Flow graph (with example)
  - b. Dominators
  - c. Natural loops
  - d. Inner loops
  - e. Reducible flow graphs



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8. Consider the following program code:

```
Prod=0;
I=1;
Do{
Prod=prod+a[i]*b[i];
I=i+1;
}while (i<=10);
```

a. Partition in into blocks

b. Construct the flow graph

5. What is code optimization? Explain machine dependent and independent code optimization.

6. What is common sub-expression and how to eliminate it? Explain with example.

7. Write a short note with example to optimize the code:

a. Dead code elimination

b. Variable elimination

c. Code motion

d. Reduction in strength

8. What is control and data flow analysis? Explain with example.



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**Name of the Subject -Soft Computing and Optimization Algorithms**

<b>Weekly Work Load (in Hrs)</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>
	<b>3</b>	-	-

<b>In-Sem</b>	<b>Theory</b>	<b>Total Marks</b>	<b>Credit</b>
<b>30</b>	<b>70</b>	<b>100</b>	<b>3</b>

**Course Objectives:**

- To know the basics behind the Design and development intelligent systems in the framework of soft computing.
- To acquire knowledge of Artificial Neural Networks Fuzzy sets, Fuzzy Logic, Evolutionary computing and swarm intelligence.
- To explore the applications of soft computing.
- To understand the need of optimization.

**Course Outcomes:**

C412D.1 Apply various soft computing methodologies.

C412D.2 Explain how evolutionary system and algorithms work.

C412D.3 Apply genetic algorithms to combinatorial optimization problems.

C412D.4 Explain the use of swarm intelligence algorithms to solve certain problems.



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**SYLLABUS**

**UNIT – I**

**Topics –**

Introduction, soft computing vs. hard computing, various types of soft computing techniques, and applications of soft computing. Basic tools of soft computing – Fuzzy logic, neural network, evolutionary computing. Introduction: Neural networks, application scope of neural networks, fuzzy logic, genetic algorithm, and hybrid systems.

**UNIT – II**

**Topics –**

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications and Defuzzifications.

**UNIT – III**

**Topics –**

Fuzzy Controller, Fuzzy rule base and approximate reasoning: truth values and tables in fuzzy logic, fuzzy propositions formation of rules, decomposition of compound rules, aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference system, fuzzy expert systems.

**UNIT – IV**

**Topics –**

Basic Evolutionary Processes, EV : A Simple Evolutionary System, Evolutionary Systems as Problem Solvers, A Historical Perspective, Canonical Evolutionary Algorithms - Evolutionary Programming, Evolution Strategies, A Unified View of Simple EAs- A Common Framework, Population Size.



### UNIT – V

#### Topics –

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, Traditional algorithm vs genetic algorithm, simple GA, general genetic algorithm, schema theorem, Classification of genetic algorithm, Holland classifier systems, genetic programming, applications of genetic algorithm, Convergence of GA. Applications and advances in GA, Differences and similarities between GA and other traditional method, applications.

### UNIT – VI

#### Topics –

Swarm intelligence, Particle Swarm Optimization (PSO) Algorithm- Formulations, Pseudo-code, parameters, premature convergence, topology, biases, Real valued and binary PSO, Ant colony optimization (ACO)- Formulations, Pseudo-code. Applications of PSO and ACO.

#### Books:

Text:

1. Paul Goransson and Chuck Black, “Software Defined Networks: A Comprehensive Approach”, Morgan Kaufmann, 2014, ISBN: 9780124166752, 9780124166844.
2. Siamak Azodolmolky, “Software Defined Networking with Open Flow, Packt Publishing, 2013, ISBN: 9781849698726
3. Thomas D. Nadeau, Ken Gray, “SDN: Software Defined Networks, An Authoritative Review of Network Programmability Technologies”, 2013, ISBN : 10:1-4493-4230-2, 978- 1-4493-4230-2





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**Teaching Plan**

<b>Sr. No.</b>	<b>Unit</b>	<b>Broad Topic to be covered</b>	<b>Books Referred</b>	<b>Total Lectures Planned</b>	<b>Mode of Delivery</b>
1	I	<b>Introduction</b>	T1, R1	8	Discussion, Presentations
2	II	<b>Fuzzy Sets and Logic</b>	T2, R3	8	Discussion, Presentations, Video and Problem Solving
3	III	<b>Fuzzy Systems</b>	T2, R3	8	Discussion, Presentations, Video and Problem Solving
4	IV	<b>Evolutionary Computing</b>	T1, R1	8	Discussion, Presentations
5	V	<b>Genetic Algorithm</b>	T2, R3	8	Discussion, Presentations
6	VI	<b>Swarm Intelligence</b>	T1, T5	8	Discussion, Presentations
Total Lectures				48	



## Question Bank

### Unit 1

- Q.1 Distinguish between Soft computing and Hard computing.
- Q.2 What is artificial neural network?
- Q.3 Define characteristics and applications of artificial neural network.
- Q.4 What is neural network architecture? Give the application scope of Neural Networks.
- Q.5 Define soft computing.
- Q.6 Distinguish between soft computing and hard computing?
- Q.7 What is neural network architecture?
- Q.8 Explain logistic sigmoid function with example.

### Unit 2

- Q.1 Write short note on: Defuzzification
- Q.2 Explain in short the membership function in Fuzzy Set.
- Q.3 Define defuzzification? Discuss any two methods of assigning membership value.
- Q.4 Two fuzzy relations are given by

$$R = \begin{matrix} & y_1 & y_2 \\ x_1 & [0.6 & 0.3] \\ x_2 & [0.2 & 0.9] \end{matrix}$$

$$S = \begin{matrix} & z_1 & z_2 & z_3 \\ y_1 & [1 & 0.5 & 0.3] \\ y_2 & [0.8 & 0.4 & 0.7] \end{matrix}$$

Obtain fuzzy relation T as a max-min composition and max-product composition between the fuzzy relations.

Q.5 For a fuzzy set,  $A = \{0.5/x_1 + 0.4/x_2 + 0.7/x_3 + 0.8/x_4 + 1/x_5\}$ , perform Fuzzy complement operation on A.

Q.6 Differentiate between Fuzzy sets and Crisp sets.

Q.7 What is Fuzzy sets? What are the properties of fuzzy sets.

Q.8 Differentiate between Fuzzyfications and Defuzzifications.

### Unit 3

Q.1 Explain in detail Adapter Neuro-Fuzzy Inference System with suitable architecture.

Q.2 Discuss fuzzy composition techniques with suitable example.

Q.3 Describe in detail the formation of inference rule in a Mamdani Fuzzy Inference System.

Q.4 The characteristics of the laundry load (input) include: The actual weight, fabric types and amount of dirt. The washing parameters (outputs) include: amount of detergent, washing time, agitation, water level and temperature. The cleaner laundry, conserving water and saving detergent, electricity, time and money needs controlling the above different parameters. Give the initial stage of designing a fuzzy control for a hypothetical washing machine.

Q.5 Explain in detail decomposition of compound rules.

Q.6 What is aggregation of fuzzy rules?



Q.7 Define fuzzy reasoning.

Q.8 Explain in detail fuzzy inference system.

Q.9 Explain in detail fuzzy expert systems.

#### **Unit 4**

Q.1 Explain the concept of Evolutionary System with suitable example.

Q.2 Explain the Evolution Strategies in detail.

Q.3 Prove that covariance matrix adaption evolution strategies.

Q.4 Explain in detail Canonical Evolutionary Algorithms.

Q.5 Explain in detail Canonical Evolutionary Algorithms with Evolutionary Programming.

Q.6 Explain in detail Evolution Strategies.

#### **Unit 5**

1. List different operators in Genetic Algorithm. Explain any one in detail.

2. State the classification of GA.

3. Explain in detail the concept “Problem Solving using GA”.

4. Explain in detail the Genetic Algorithm based back propagation network.



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5. Compare Genetic Algorithm and Traditional Algorithm

**Unit 6**

Q.1 Define Psychological System.

Q.2 Explain is Swarm with suitable examples.

Q.3 What are the requirements of philosophical leaps?

Q.4 Explain Ant Colony Optimization Algorithm.

Q.5 How to calculate performance of PSO?

Q.6 Explain Particle Swarm Optimization Algorithm.

Q.7 What are the Applications of Ant Colony Optimization Algorithm?

Q.8 Explain Application of Social Psychology.

Q.9 Why do people use ACO and PSO?

Q.10 Explain functions of Particle Swarm Optimization Algorithm.

Q.11 What are the advantages of Swarm Intelligence?

Q.12 Explain the recent developments in Swarm Intelligence Applications?

Q.13 What are the Applications of Particle Swarm Optimization Algorithm?

**Name of the Course: Cloud Computing**

<b>Weekly Work Load(in Hrs)</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>
	03	-	04

<b>Insem</b>	<b>Theor y</b>	<b>Presentation</b>	<b>Oral</b>	<b>Term-work</b>	<b>Total Marks</b>	<b>Credi t</b>
30	70	50	-	50	200	05

**Course Objectives:**

1. To understand cloud computing concepts;
2. To study various platforms for cloud computing
3. To explore the applications based on cloud computing

**Course Outcomes**

C413C.1 Identify the architecture, infrastructure and service models of cloud computing.

C413C.2 Explain cloud security and cloud file systems.

C413C.3 Choose virtualization structures, tools and mechanisms.

C413C.4 Design and Develop cloud solutions for an application scenario using AWS core services.

C413C.5 Explain innovative applications of IOT and future applications of cloud computing

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**Syllabus:**

<b>Unit</b>	<b><u>Course Contents</u></b>	<b><u>Hours</u></b>
<b>I</b>	<b><u>Introduction to Cloud Computing</u></b>	<b>07</b>
	Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven-step model of migration into a Cloud, Trends in Computing. Cloud Service Models: SaaS, PaaS, IaaS, Storage. Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Cloud System Architecture, Cloud Deployment Models.	
<b>II</b>	<b><u>Data Storage and Cloud Computing</u></b>	<b>07</b>
	Data Storage: Introduction to Enterprise Data Storage, Direct Attached Storage, Storage Area Network, Network Attached Storage, Data Storage Management, File System, Cloud Data Stores, Using Grids for Data Storage. Cloud Storage: Data Management, Provisioning Cloud storage, Data Intensive Technologies for Cloud Computing. Cloud Storage from LANs to WANs: Cloud Characteristics, Distributed Data Storage.	
<b>III</b>	<b><u>Virtualization in Cloud Computing</u></b>	<b>07</b>
	Introduction: Definition of Virtualization, Adopting Virtualization, Types of Virtualization, Virtualization Architecture and Software, Virtual Clustering, Virtualization Application, Pitfalls of Virtualization. Grid, Cloud and Virtualization: Virtualization in Grid, Virtualization in Cloud, Virtualization and Cloud Security. Virtualization and Cloud Computing: Anatomy of Cloud Infrastructure, Virtual infrastructures, CPU Virtualization, Network and Storage Virtualization.	
<b>IV</b>	<b><u>Cloud Platforms and Cloud Applications</u></b>	<b>07</b>
	Amazon Web Services (AWS): Amazon Web Services and Components, Amazon Simple DB, Elastic Cloud Computing (EC2), Amazon Storage System, Amazon Database services (Dynamo DB). Microsoft Cloud Services: Azure core concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Computing Applications: Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Geosciences: Satellite Image Processing, Business and Consumer Applications: CRM	



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	and ERP, Social Networking, Google Cloud Application: Google App Engine. Overview of OpenStack architecture.	
<b>V</b>	<b><u>Security in Cloud Computing</u></b>	<b>07</b>
	Risks in Cloud Computing: Risk Management, Enterprise-Wide Risk Management, Types of Risks in Cloud Computing. Data Security in Cloud: Security Issues, Challenges, advantages, Disadvantages, Cloud Digital persona and Data security, Content Level Security. Cloud Security Services: Confidentiality, Integrity and Availability, Security Authorization Challenges in the Cloud, Secure Cloud Software Requirements, Secure Cloud Software Testing.	
<b>VI</b>	<b><u>Advanced Techniques in Cloud Computing</u></b>	<b>07</b>
	Future Trends in cloud Computing, Mobile Cloud, Automatic Cloud Computing: Comet Cloud. Multimedia Cloud: IPTV, Energy Aware Cloud Computing, Jungle Computing, Distributed Cloud Computing Vs Edge Computing, Containers, Docker, and Kubernetes, Introduction to DevOps. IOT and Cloud Convergence: The Cloud and IoT in your Home, The IOT and cloud in your Automobile, PERSONAL: IoT in Healthcare.	

**Text:**

1. A. Srinivasan, J. Suresh, "Cloud Computing: A Practical Approach for Learning and Implementation", Pearson, ISBN: 978-81-317-7651-3
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, ISBN-13:978-1-25-902995-0

**References:**

1. James Bond, "The Enterprise Cloud", O'Reilly Media, Inc. ISBN: 9781491907627
2. Dr. Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more", Wiley Publications, ISBN: 978-0-470-97389-9
3. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", 2010, The McGraw-Hill.





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**Teaching Plan**

<b>Sr. No.</b>	<b>Unit</b>	<b>Broad Topic to be covered</b>	<b>Books Referred</b>	<b>Total Lectures Planned</b>
1	I :	Notion and Concepts	T1,R1,R2	08
2	II :	Parsing	T1,R1,R2	08
3	III :	Syntax Translation Schemes	T1,R1	08
4	IV :	Run-time Storage Management	T1,R2	08
5	V :	Code Generation	T1,T2,R2	08
6	VI :	Code Optimization	T1,T2,R2	08



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**Question bank**

1. What is cloud computing? Enlist and explain applications of cloud computing.
2. What is SOA? Explain the role of SOA in SaaS.
3. Explain the Elastic load Balancer and its types with its advantages and
4. disadvantages.
5. Draw and explain the Amazon EC2 execution environment.
6. Explain in detail the Storage System in Amazon with suitable diagram.
7. Write a short note on Windows Azure Platform Appliance.
8. List and explain the various Cloud Computing Applications.
9. Write a short note on Google App Engine.
10. Write a brief note on OpenStack Architecture.
11. What is Cloud Computing? What are the components of Cloud Computing?
12. Explain with neat architecture diagram.
13. What are the advantages and disadvantages of Cloud Computing?
14. Explain Cloud Deployment models.
15. Explain in brief Seven-step Model of Migration into a cloud.
16. Explain in brief cloud service models with its advantages and disadvantages.
17. Define Virtualization. Explain types of Virtualization in detail.
18. Write a short note on Microsoft Hyper-V.
19. Explain different levels of Virtualization implementation with a neat diagram. Also give examples of each.
20. Discuss the disadvantages of Hardware level Virtualization along with the solutions to overcome.
21. What is hypervisor? Write a short note on Xen Architecture.
22. Explain full and para virtualization with examples.
23. Explain the following : a) CPU Virtualization b) Memory Virtualization
24. Explain the Open Virtualization Format.
25. Explain in brief Virtual Clusters and Resource Management.
26. Explain Structure, Tools and Mechanism of Virtualization.
27. Justify Cloud Computing is the fusion of Grid computing and SOA.
28. Explain different types of hypervisors with examples.
29. Compare KVM, XEN and VMW are work Station.
30. Explain in Virtualization attack in detail with suitable diagrams.
31. Explain Virtualization and Cloud Security.
32. Explain the Anatomy of Cloud infrastructure.
33. Explain in brief Network and Storage Virtualization with suitable diagrams. Also explain advantages and disadvantages.
34. What are the security challenges in Cloud security.
35. Draw and explain architecture of Amazon Dynamo.
36. Explain the steps for configuring a server for EC2.
37. What are AWS load balancing services?
38. Explain the Elastic load Balancer and its types with its advantages and disadvantages.



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39. Write a note on Services Offered by Amazon.
40. Draw and explain the Amazon EC2 execution environment.
41. Explain in detail the Storage System in Amazon with suitable diagram.
42. Write down the core concepts of Azure.
43. Write a short note on Windows Azure Platform Appliance.
44. List and explain the various Cloud Computing Applications.
45. Write and explain the following Cloud Computing Applications in detail:
  - a) Healthcare : ECG Analysis
  - b) Biology : Protein Structure prediction
  - c) Geosciences: Satellite Image Processing
  - d) Business and Consumer Applications
46. Write a short note on Google App Engine.
47. Write a brief note on OpenStack Architecture.

Q.1 Recording of information in a storage medium is called ----- .

- a) Data
- b) Storage
- c) Data Preservation
- d) Data Storage

Ans: (d) Data Storage

Q.2 ----- refers to a digital storage system directly attached to a server or workstation, without a network in between.

- a) Data Storage
- b) Storage Area Network (SAN)
- c) Direct Attached Storage (DAS)
- d) None.



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Ans: (c) Direct Attached Storage (DAS)

Q.3 SATA stands for ----- .

- a) Small Advancement Technology Attachment
- b) Scale Advanced Technology Attachment
- c) Serially Advanced Technical Attachment
- d) Serial Advanced Technology Attachment

Ans: (d) Serial Advanced Technology Attachment

Q.4 The SAN consists of three main components namely -----

- a) Host layer, Guest layer, Storage layer
- b) Host layer, Fabric layer, Storage layer
- c) Host layer, Fibric layer, Storage layer
- d) Host layer, VM layer, Storage layer

Ans: (b) Host layer, Fabric layer, Storage layer

Q.5 The design of the fabric in SAN is directly responsible for the SAN's ----- and --  
-----

-----.

- a) reliability and complexity
- b) availability and security
- c) integrity and complexity
- d) complexity and availability

Ans: (a) reliability and complexity



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Q.6 i) NAS devices typically do not have a keyboard or display.

ii) NAS are configured and managed with a browser-based utility.

State which of the statement / statements is / are True or False.

- a) Only i) is True
- b) Both i) and ii) are False
- c) Only ii) is True
- d) Both i) and ii) are True

Ans: (d) Both i) and ii) are True

Q.7 Manage smart TV storage, manage security systems and security updates, create a media streaming service, manage torrent files are Use Cases of -----.

- a) DAS
- b) SAN
- c) NAS
- d) Enterprise Data Storage

Ans: (c) NAS

Q.8 ----- is the allocation of a cloud provider's resources and services to a customer.

- a) Cloud Computing
- b) Cloud Servicing
- c) Cloud Storage
- d) Cloud Provisioning

Ans: (d) Cloud Provisioning

Q.9 MapReduce, Hadoop and HPCC are the examples of modern system architecture



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designed for -----

- a) Cloud Computing
- b) Data Computing
- c) Data-Intensive Computing
- d) Intensive Computing

Ans: (c) Data-Intensive Computing

Q.10 Automation, Cost management, Performance monitoring, Governance and ----- are the main components of Cloud Data Management.

- a) Security
- b) Space
- c) Service
- d) Selective

Ans: (a) Security

Q.11 Which of the following is an example of a PaaS cloud service?

- a) Heroku
- b) AWS Elastic Beanstalk
- c) Windows Azure
- d) All of the above

View Answer

Answer: d

Explanation: PaaS stands for Platform-as-a-Service. In PaaS, the users receive hardware or software tools from the users on the internet. AWS Elastic Beanstalk, Windows Azure, Heroku are example of a PaaS service.



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Q.12 Which of the following is the most refined and restrictive cloud service model?

- a) PaaS
- b) IaaS
- c) SaaS
- d) CaaS

View Answer

Answer: a

Explanation: The most refined and restrictive service model is when a service needs the client to use the entire hardware/software/application stack.

Q.13 Which of the following is the application of cloud computing?

- a) Adobe
- b) Paypal
- c) Google G Suite
- d) All of the above

View Answer

Answer: d

Explanation: Adobe Creative Cloud is used in the art sector. Paypal is an online payment application. Google G Suite is the best storage and backup application used by google.

Q.14 Which of the following architectural standards is working with cloud computing industry?

- a) Web-application frameworks
- b) Service-oriented architecture
- c) Standardized Web services
- d) All of the mentioned

View Answer

Answer: b



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Explanation: These standards help to enable different business models that cloud computing vendors can support, most notably Software as a Service (SaaS), Web 2.0 applications, and utility computing.

Q.15 Cloud computing is a \_\_\_\_\_ computer architecture. (Level-3)

- A. Graphical depiction
- B. Computer
- C. Computing depiction
- D. None of the above

Answer: A

Q.16 SIMPLE is a \_\_\_\_\_ protocol.

Standard protocol

Open standard protocol

Demand protocol

Close standard protocol

Answer: A

Q.17 I/O requests to disk storage on a SAN are called (Level-3)

- a) File I/Os
- b) SAN I/Os
- c) Block I/Os
- d) Disk I/Os

View Answer





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Answer: c

Explanation: None.

Q.18 All cloud computing applications suffer from the inherent \_\_\_\_\_ that is intrinsic in their WAN connectivity.

- a) noise
- b) propagation
- c) latency
- d) all of the mentioned

View Answer

Answer: c

Explanation: While cloud computing applications excel at large-scale processing tasks, if your application needs large amounts of data transfer, it may not be the best model for you.

Q.19 Which of the following system provide limited storage to the user?

- a. Paas – platform as a service
- b. Iaas - infrastructure as a service
- c. Saas – software as a service
- d. Both a and b

Answer: B



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**Name of the Subject –410253 (D): Business Intelligence (BI)**

<b>Weekly Work Load(in Hrs)</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>
	<b>3</b>	-	-

<b>In-Sem</b>	<b>Theory</b>	<b>Total Marks</b>	<b>Credit</b>
<b>30</b>	<b>70</b>	<b>100</b>	<b>3</b>

**Course Objectives**

1. To understand the fundamentals of Business Intelligence.
2. To identify the appropriateness and need to analyze the data.
3. To learn the preprocessing, mining and post processing of the data.
4. To understand various methods, techniques and algorithms in Business Intelligence.

**Course Outcomes**

C413D.1 Apply visualization and Knowledge Delivery techniques to develop BI applications.

C413D.2 Analyze the real world problems & Apply Decision support techniques.

C413D.3 Apply various data Pre-processing techniques on BI applications.

C413D.4 Choose & Apply various Data Mining Techniques to explore the hidden patterns.



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**Syllabus:**

<b>Unit</b>	<b><u>Course Contents</u></b>	<b><u>Hours</u></b>
<b>I</b>	<b>Basics of Data Mining</b>	<b>08</b>
	Effective and timely decisions, Data, information and knowledge, Role of mathematical models, Business intelligence architectures: Cycle of a business intelligence analysis,	
<b>II</b>	<b>Knowledge Delivery</b>	<b>08</b>
	The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis. Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization	
<b>III</b>	<b>Decision Making Concept</b>	<b>08</b>
	Information Systems Development and Project Management, Managing Data Resources, Business Process Integration and Enterprise Systems, ICT for Development and E-Governance, Case Studies - in-house or cloud based ERP	
<b>IV</b>	<b>Data Pre-processing</b>	<b>08</b>
	Discovery, Data preparation, Preprocessing requirements, data cleaning, data integration, data reduction, data transformation, Data discretization and concept hierarchy generation, Model Planning, Model building, Communicating Results & Findings, Operationalizing, Introduction to OLAP.	
<b>V</b>	<b>Classification &amp; Unsupervised Learning</b>	<b>08</b>
	Classification: Classification Problem, Classification Models, Classification Trees, Bayesian Method; Association Rule: Structure of Association Rule, Apriori Algorithm, General Association; Clustering: Clustering Methods, Partition Methods, Hierarchical Methods.	
<b>VI</b>	<b>BI Applications</b>	<b>08</b>
	Data analytics, business analytics, ERP and Business Intelligence, BI Applications in CRM, BI Applications in Marketing, BI Applications in Logistics and Production, Role of BI in Finance, BI Applications in Banking, BI Applications in Telecommunications .	



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**TEXT Books:**

- 1.1. R. Sharda, D. Delen, & E. Turban, Business Intelligence and Analytics. Systems for Decision Support, 10th Edition. Pearson/Prentice Hall, 2015. ISBN-13: 978-0-13-3050905, ISBN-10: 0-13-305090-4
- 1.2. Introduction to business Intelligence and data warehousing, IBM, PHI.

**Reference Books:**

- 2.1. Business Intelligence – Data Mining and Optimization for Decision Making – Carlo Vercellis – Wiley Publications.
- 2.2. Big Data & Analytics – Seema Acharya & Subhashini Chellappan – Wiley Publications
- 2.3. David Dietrich, Barry Hiller, “Data Science & Big Data Analytics”, EMC education services, Wiley publications, 2012 .
- 2.4. Data mining concepts and techniques, Jawai Han, Michelline Kamber, Jiran Pie, Morgan Kaufmann Publishers 3rd edition

**Reference Links:**

- 1.1 NPTEL - Data Mining - <https://www.youtube.com/watch?v=ykZ-UGcYWg&list=PLLspfyOYoQcI6Nno3gPkq0h5YSe81hsc>
- 1.2 NPTEL Business Intelligence – [https://www.youtube.com/watch?v=7cmZResH3Ow&list=PLLy\\_2iUCG87C6Ni9RROAcJ7dKIcNMOtI5](https://www.youtube.com/watch?v=7cmZResH3Ow&list=PLLy_2iUCG87C6Ni9RROAcJ7dKIcNMOtI5)

**Teaching Plan**

Sr. No.	Unit	Broad Topic to be covered	Books Referred	Total Lectures
1	Basics of Data Mining	Business intelligence architectures, Role of mathematical models	1.1	8
2	Knowledge Delivery	The business intelligence user types	3.1	8
3	Decision Making	Decision Support System (DSS)	1.1, 2.1	8
4	Data Pre-processing	data integration, data reduction, concept hierarchy generation,	1.1, 2.1	8
5	Classification &	Classification, Association Rule, Clustering	1.1, 2.1	8
6	BI Applications	Data analytics, business analytics, BI Applications in different domain	1.1, 2.2	8



### **Question Bank**

#### **Unit 1.**

- Describe Business Intelligence system Development Phase. Which Phase of BI consume more time justify the reason.
- Differentiate Data, Information and Knowledge with example.
- Does mathematical model play important role in BI? Justify your answer?
- Explain Business Intelligent cycle with example.
- Explain High level architecture of BI with suitable diagram.
- Describe Business Intelligence system development phase. Which phase of BI system consumes more time? Justify the reason.

#### **Unit II**

- Explain business intelligent user type.
- Explain different types of visualization method.
- Explain standard reports, Interactive Analysis and Ad Hoc Querying.
- What is BI dashboard? Explain significance of BI dashboard with one example.
- Explain various types of charts and graphs used in visualization of BI system.
- Justify with reason why reporting is important in BI system.
- What is parameterizing reports and self-service reporting?
- Discuss dimensional analysis in detail.

#### **Unit III**

- Explain component of Decision support system with diagram
- Explain various data mining techniques in Decision support system
- Explain Types of Decision support system.
- Explain main characteristics of Decision support system.
- What are main limitation of DSS?
- Explain the application of DSS for retail shop management.



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**Unit IV**

- What is the need of data pre-processing Outline the issues to handle missing Data during data cleaning process.
- Explain and Illustrate the concept hierarchy generation
- From the given attribute values 35,45,50,55,60,65,75 Estimate mean, median, mode & five number summary
- Consider a data warehouse for a hospital where there are three dimensions Doctor, patients & Time and two measures count & charge, where charge is the fee that the doctor charges a patient for a visit. Using the above example discuss the following OLAP operations. 1. Slice 2. Dice 3. Rollup 4. Drill Down 5. Pivot
- What is the need of data pre-processing? Explain various data cleaning techniques.
- What is data normalization in data pre-processing? Explain following data normalization methods with example:
  - i) Min-Max normalization
  - ii) Z-score normalization
- Explain “Fact Constellation schema” with suitable example.
- 

**Unit V**

- Entropy is an important concept in information theory. Explain its significance in mining context.
- Explain Naive Baye’s Classification.
- Describe the essential features of decision trees in context of classification.
- What are the advantages and disadvantages of decision trees over other classification methods?
- Explain ID3 Algorithm.
- Explain classification by Decision tree induction?
- Explain Bayesian classification?
- Explain the general approach for building a classification model?
- What are the various characteristics of decision tree induction?
- Explain the rule based classifier with an example?
- Explain the Nearest-Neighbor classifier?
- Discuss the k-nearest neighbor classification algorithm?
- Explain the characteristics of Nearest-Neighbor classifiers?



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**Unit VI**

- What is difference between Data Analytics & Business Analytics?
- Explain in details ERP and Business Intelligence
- Explain in details BI Applications in CRM
- Explain in details BI Applications in Marketing
- Explain in details BI Applications in Logistics and Production
- Explain in details Role of BI in Finance
- Explain in details BI Applications in Banking
- Explain in details BI Applications in Telecommunications .



**Name of the Subject –Laboratory Practice III**

<b>Weekly Work Load(in Hrs)</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>
	-	-	<b>04</b>

<b>Online/ In-sem</b>	<b>Theory</b>	<b>Practical</b>	<b>Oral</b>	<b>Term- work</b>	<b>Total Marks</b>	<b>Credit</b>
-	-	-	<b>50</b>	<b>50</b>	<b>100</b>	<b>2</b>

**Course Objectives**

1. To understand and apply different supervised learning techniques.
2. To understand and apply different unsupervised learning techniques.
3. To understand and apply different encryption algorithms.
4. To analyze different security tools.

**Course Outcomes**

C414.1 Analyze the data set and apply different supervised learning techniques.

C414.2 Analyze the data set and apply different unsupervised learning techniques.

C414.3 Apply standard encryption techniques to provide security.

C414.4 Apply an algorithm for authentication and confidentiality.





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<u>Machine Learning</u>	<u>Problem Statement</u>
<b>Batch B1/B2/B3/B4</b>	1. Analyze the data set and apply Linear Regression on it. The data set has results of a recently conducted study on the correlation of the number of hours spent driving with the risk of developing acute backache. Find the equation of the best fit line for this data.
	2. Analyze and apply Decision Tree Classifier on a dataset collected in a cosmetics shop showing details of customers and whether or not they responded to a special offer to buy a new lip-stick is shown in table below. Use this dataset to build a decision tree, with Buys as the target variable, to help in buying lip-sticks in the future. Find the root node of decision tree. According to the decision tree you have made from previous training data set, what is the decision for the test data: [Age < 21, Income = Low, Gender = Female, Marital Status = Married].
	3. Analyze the data set and apply k-NN Classification, on the details given in the following diagram. let blue circles indicate positive examples and orange squares indicate negative examples. We want to use k-NN algorithm for classifying the points. If k=3, find the class of the point (6,6). Extend the same example for Distance-Weighted k-NN and Locally weighted Averaging.
	4. Analyze and apply K-Means Clustering, We have given a collection of 8 points. P1=[0.1,0.6] P2=[0.15,0.71] P3=[0.08,0.9] P4=[0.16, 0.85] P5=[0.2,0.3] P6=[0.25,0.5] P7=[0.24,0.1] P8=[0.3,0.2]. Perform the k-mean clustering with initial centroids as m1=P1 =Cluster#1=C1 and m2=P8=cluster#2=C2. Solve the following, 1] Which cluster does P6 belongs to? 2] What is the population of cluster around m2? 3] What is updated value of m1 and m2?
<b>Mini Project-1</b>	Apply the Support vector machine for classification on a dataset obtained from UCI ML repository. For Example: Fruits Classification or Soil Classification or Leaf Disease Classification.
<b>Information and Cyber Security</b>	<u>Problem Statement</u>
	1. Implementation of S-DES.
	2. Implementation of S-AES.
	3. Implementation of Diffie-Hellman key exchange.



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<b>Batch B1/ B2/B3/B4</b>	4. Implementation of RSA / ECC algorithm.
<b>Mini Project-2</b>	SQL Injection attacks and Cross -Site Scripting attacks are the two most common attacks on web application. Develop a new policy based Proxy Agent, which classifies the request as a scripted request or query based request, and then, detects the respective type of attack, if any in the request. It should detect both SQL injection attack as well as the Cross-Site Scripting attacks.



### Name of the Subject –Laboratory Practice IV

Weekly Work Load(in Hrs)	Lecture	Tutorial	Practical
	-	-	04

Online/ In-sem	Theory	Practical	Oral	Term- work	Total Marks	Credit
-	-	-	50	50	100	2

#### Course Objectives

1. To introduce process of compilation
2. To address issues in code generation and optimization
3. To know the basics behind the Design and development intelligent systems in the framework of soft computing.
4. To acquire knowledge of Artificial Neural Networks Fuzzy sets, Fuzzy Logic, Evolutionary computing and swarm intelligence.
5. To understand the fundamentals of Business Intelligence
6. To identify the appropriateness and need Analysis the data
7. To understand various methods, techniques and algorithms in Business Intelligence
8. To understand cloud computing concepts
9. To study various platforms for cloud computing
10. To explore the applications based on cloud computing

#### Course Outcomes

C415.1 Apply various soft computing methodologies. / Construct Lexical analyzer and Parsers using LEX and YACC tools.

C415.2 Make use of swarm intelligence algorithms to solve real world problems. / Make use of various code optimization and generation algorithms to build the compiler.

C415.3 Make use of BAI techniques to analyze the data. / Design and Develop cloud applications for the given problem.

C415.4 Analyze the output generated by the process of Business Intelligence. / Analyze the components of Openstack, Google Cloud Platform, Amazon Web Services, Microsoft Azure.



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**List of Assignments**

Course no.	Sr. No.	Title	Bloom's Level
CO415.1	LA1	Implement a Lexical Analyzer using LEX for a subset of C. Cross check your output with Stanford LEX	L3
	LA2	Implement a parser for an expression grammar using YACC and LEX for the subset of C. Cross check your output with Stanford LEX and YACC	
	LA3	Generate and populate appropriate Symbol Table.	
	LA4	Implementation of Semantic Analysis Operations (like type checking, verification of function parameters, variable declarations and coercions) possibly using an Attributed Translation Grammar.	
	LA1	Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform max-min composition on any two fuzzy relations.	
	LA2	Implement genetic algorithm for benchmark function (eg. Square, Rosenbrock function etc) Initialize the population from the Standard Normal Distribution. Evaluate the fitness of all its individuals. Then you will do multiple generation of a genetic algorithm. A generation consists of applying selection, crossover, mutation, and replacement. Use: <ul style="list-style-type: none"> <li>• Tournament selection without replacement with tournament size s</li> <li>• One point crossover with probability <math>P_c</math></li> <li>• bit-flip mutation with probability <math>P_m</math></li> <li>• use full replacement strategy</li> </ul>	
	LA4	Implement basic logic gates using Mc-Culloch-Pitts or Hebbnet neural networks	
LA5	Write a program to find the Boolean function to implement following single layer perceptron. Assume all activation functions to be the threshold function which is 1 for all input values greater than zero and 0, otherwise. <div style="text-align: center;"> </div>		
CO415.1	LA7	The figure shows a single hidden layer neural network. The weights are initialized to 1's as shown in the diagram and all biases are initialized to 0's. Assume all the neurons have linear activation functions. The neural network is to be trained with stochastic (online) gradient descent. The first training example is $[x_1=1, x_2=0]$ and the desired output is 1. Design the back-propagation algorithm to find the updated value for $W_{11}$ after backpropagation.	



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		<p>Choose the value that is the closest to the options given below: [learning rate =0.1]</p> <pre> graph LR     x1((x1)) -- w11=1 --&gt; h1((h1))     x1 -- w12=1 --&gt; h2((h2))     x2((x2)) -- w21=1 --&gt; h1     x2 -- w22=1 --&gt; h2     h1 -- w31=1 --&gt; y((y))     h2 -- w32=1 --&gt; y     </pre>	
	M1	<p><b>Mini-Project 1</b> on Genetic Algorithm: Apply the Genetic Algorithm for optimization on a dataset obtained from UCI ML repository. For Example: IRIS Dataset or Travelling Salesman Problem or KDD Dataset</p>	
	M2	<p><b>Mini-Project 2</b> on Fuzzy Logic: Solve Greg Viot's fuzzy cruise controller using MATLAB Fuzzy logic toolbox or Octave or Python.</p>	
	M3	<p><b>Mini-Project 3</b> on Fuzzy Logic: Solve Air Conditioner Controller using MATLAB Fuzzy logic toolbox or Octave or Python.</p>	
CO415.2	LA5	Implement the front end of a compiler that generates the three address code for a simple language	L3
	LA6	A Register Allocation algorithm that translates the given code into one with a fixed number of registers	
	LA7	Implementation of Instruction Scheduling Algorithm.	
	LA8	Implement Local and Global Code Optimizations such as Common Sub-expression Elimination, Copy Propagation, Dead-Code Elimination, Loop and Basic-Block Optimizations. (Optional)	
	LA3	<p>Implement Particle swarm optimization for benchmark function (eg. Square, Rosenbrock function). Initialize the population from the Standard Normal Distribution. Evaluate fitness of all particles. Use :</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <math>c1=c2 = 2</math></li> <li><input type="checkbox"/> Inertia weight is linearly varied between 0.9 to 0.4.</li> <li><input type="checkbox"/> Global best variation</li> </ul>	L3
	LA9	Apply the Particle swarm optimization for Travelling Salesman Problem	
CO415.1 & CO415.2	M1	Mini-Project 1: Implement POS tagging for simple sentences written Hindi or any Indian Language	L3
CO415.3 & CO415.4	LA09	Use Business intelligence and analytics tools to recommend the combination of share purchases and sales for maximizing the profit	L3
	LA10	On Twitter Data performs computing using BIA tools electively.	
	M2	Mini Project: Frame the suitable assignment to perform computing using BIA tools effectively	L4
	M3	Mini Project: Sentiment Analysis of Whatsapp data analytics tools	
	LA1	Installation and configuration of own Cloud	



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CO415.3 & CO415.4	LA2	Implementation of Virtualization in Cloud Computing to Learn Virtualization Basics, Benefits of Virtualization in Cloud using Open Source Operating System	
	LA3	Study and implementation of infrastructure as Service using Open Stack	
	LA4	Write a program for Web feed using PHP and HTML	
CO415.3 & CO415.4	LA5	Write a Program to Create, Manage and groups User accounts in own Cloud by Installing Administrative Features.	
	LA6	Case study on Amazon EC2 to learn about Amazon EC2, Amazon Elastic Compute Cloud is a central part of Amazon.com's cloud computing platform, Amazon Web Services. How EC2 allows users torrent virtual computers on which to run their own computer applications.	
	LA7	Case study on Microsoft azure to learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, for building, deploying and managing applications and services through a global network of Microsoft-managed datacenters. How it work, different services provided by it.	
	LA8	Design and develop custom Application (Mini Project) using Salesforce Cloud.	
	LA9	Assignment to install and configure Google App Engine.	
	LA10	Design an Assignment to retrieve, verify, and store user credentials using Firebase Authentication, the Google App Engine standard environment, and Google Cloud Data store.	
	LA11	Creating an Application in Salesforce.com using Apex programming Language.	
	LA12	Design an Assignment based on Working with Mangrasoft Aneka Software	
	M4	Mini-Project 1: Setup your own cloud for Software as a Service (SaaS) over the existing LAN in your laboratory. In this assignment you have to write your own code for cloud controller using open source technologies without HDFS. Implement the basic operations may be like to upload and download file on/from cloud in encrypted form.	
	M5	Mini-Project 2: Setup your own cloud for Software as a Service (SaaS) over the existing LAN in your laboratory. In this assignment you have to write your own code for cloud controller using open source technologies to implement with HDFS. Implement the basic operations may be like to divide the file in segments/blocks and upload/ download file on/from cloud in encrypted form	