# IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)Scheme Based on AICTE Flexible Curriculum

## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

### Semester–VI

| Sr. No. | Course Type | Course Code | Course Name | Teaching Scheme | | | Credits |
|---|---|---|---|---|---|---|---|
| | | | | L | T | P | |
| 1. | PCC | CL13 | Natural Language Processing | 2 | 1 | - | 3 |
| 2. | PCC | CL14 | Introduction to Data Science | 2 | 1 | - | 3 |
| 3. | PCC | CL15 | Automata and Compiler Design | 3 | - | - | 3 |
| 4. | PEC | CL02 | Elective -II | 3 | - | - | 3 |
| 5. | HSMC | HS05 | Humanities and Social Sciences Open Courses - I | 2 | - | - | 2 |
| 6. | IOC | CL01 | Interdisciplinary Open Course -I | 3 | - | - | 3 |
| 7. | LC | CL13 (P) | Natural Language Processing Lab | - | - | 2 | 1 |
| 8. | LC | CL14 (P) | Data Analytics using tools (Power BI/Tableau etc.) | - | - | 4 | 2 |
| 9. | PROJ | CL03 | Minor Project | - | - | 4 | 2 |
| 10. | PROJ | CL04 | Evaluation of Internship-I | - | - | 4 | 2 |
| 11. | MLC | MLC04 | Intellectual Property Rights | 1 | - | - | Audit |
| 12. | PROJ | – | Internship-II | Credit to be added in Seventh Semester. | | | |
| Total Academic Engagement and Credits | | | | 16 | 2 | 14 | 24 |
| | | | | 32 | | | |

| Electives-II | Humanities and Social Sciences Open Courses - I | Inter-disciplinary open Course - I |
|---|---|---|
| (A) Software Engineering | (A) English Language Proficiency | (A) Scientific Aptitude |
| (B) Soft Computing | (B) German Language | (B) Robotics |
| (C) Computer Vision | (C) French Language | (C) Multivariable Calculus |
| (D) Cryptography and Network Security | (D) Japanese Language | (D) Fundamentals of Fire and Safety |

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| PCC-CL13 | Natural Language Processing | 2L: 1T (4 hrs.) | Credits: 3 |
|---|---|---|---|

**Prerequisite:** Engineering Mathematics, Theory of Computation

### Course Objective:

To gain the knowledge for developing advanced technology of computer System like speech recognition and machine translation.

### Course Contents :( 40 hrs)

**Module 1:** **(06 hrs.)**

Introduction to Natural Language Understanding- Levels of language analysis-Syntax, Semantics, Pragmatics, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

**Module2:** **(10hrs.)**

Computational Phonology: speech sound, phonetic transcription, text to speech, Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-grams.

**Module 3:** **( 8hrs.)**

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

**Module 4:** **(08 hrs.)**

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, Word Net.

**Module 5:** **(06 hrs.)**

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

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### Course Outcomes:

1. To tag a given text with basic Language features.
2. To design an innovative application using NLP components.
3. To implement a rule-based system to tackle morphology/syntax of a language.
4. To design a tag set to be used for statistical processing for real-time applications.
5. To compare and contrast the use of different statistical approaches for different types of NLP applications.

### List of Text / Reference Books:


1. D. Jurafsky and J.H. Martin, "Speech and Language Processing", Prentice Hall,2000.
2. C. Manning and H. Schutze,"Foundations of Statistical Natural Language Processing", MIT Press 3.James Allen."Natural Language Understanding", Addison Wesley,1994.
3. Richard M Reese, "Natural Language Processing with Javall", OReilly Media,2015.
4.Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press,2008

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## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

| PCC-CL 14 | Introduction of Data Science | 2L: 1T (4 hrs.) | Credits: 3 |
|---|---|---|---|

**Prerequisite:** Basics of Statistics and Probability

## Course Objective:

The objective of this course is to familiarize students with the roles of a data scientist and enable them to analyze data to derive meaningful information from it.

## Course Contents:

**Module 1:** **(06 hrs.)**

Introduction: Definition of Data Science, Big Data and Data Science hype and getting past the hype, Datafication, Current landscape of perspectives, Statistical Inference, Populations and samples, Statistical modeling, probability distributions, fitting a model, Over fitting.
Basics of R: Introduction, Environment Setup, Programming with R, Basic Data Types.

**Module2:** **(12 hrs.)**

**Data Collection and Data Pre-Processing**
Overview of Vectors, Matrices, Factors, Data Frames, Lists and Data Collection Strategies, Data Pre-Processing Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization.

**Module 3:** **( 10hrs.)**

**Exploratory Data Analytics**
Descriptive Statistics – Mean Standard Deviation, Skewness and Kurtosis, Box Plots, Pivot Table, Heat Map, Correlation Statistics, ANOVA. Exploratory Data Analysis - Basic tools (plots, graphs, and summary statistics) of EDA, Philosophy of EDA - The Data Science Process.

**Module 4:** **(08 hrs.)**

**Data Reduction:** Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation.

**Module 5:** **(04 hrs.)**

Data Visualization Basics, Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making.

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### Course Outcomes:

1. Understanding data and its types for analysis.
2. Describe the data using various statistical measures with understanding of data collection and pre-processing.
3. Use appropriate exploratory data analysis techniques for data science problems.
4. Perform data reduction to solve problems effectively.
5. Apply data science visualization techniques in real-world contexts to communicate these solutions effectively.

### List of Text / Reference Books:


1. Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly, 2015.
2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
3. Hadley Wickham and Garrett Grolemund, "R for Data Science", O'Reilly, 2017.
4. Machine Learning – Tom M. Mitchell, - MGH.
5. Crawley, M. J. (2006), "Statistics - An introduction using R", John Wiley, London 32
6. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

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## Bachelor of Technology (B.Tech.)

| PCC-CL 15 | Automata & Compiler Design | 3L: 0T (3 hrs.) | Credits: 3 |
|---|---|---|---|

### Prerequisite:

### Course Objective:

To explain the different stages in the process of compilation.

### Course Contents:

**Module 1:** **(06 hrs.)**

Fundamentals: Formal Languages, Strings, Alphabets, Languages, Chomsky Hierarchy of languages. Finite Automata: Introduction to Finite State machine, Acceptance of strings and languages, Deterministic finite automaton (DFA) and Non-deterministic finite automaton (NFA), NFA with €-moves.

**Module2:** **(15 hrs.)**

Regular Languages: Regular expressions, Conversion of a given regular expression into a finite automaton, Conversion of finite automata into a regular expression, Pumping lemma for regular sets, Closure properties of regular sets (proofs not required). Context Free Grammars: Context free grammars and languages, Derivation trees, Leftmost and rightmost derivation of strings and Sentential forms, Ambiguity, Pumping Lemma for Context free Languages.

**Module 3:** **(06 hrs.)**

Pushdown Automata: Introduction to Pushdown automata, Types of PDA, Design of PDA, Equivalence of context free grammar and pushdown automata.

Turing Machine: Introduction to Turing Machine, Design of Turing machines, Types of Turing machines.

**Module 4:** **(06 hrs.)**

Introduction To Compiling: Overview of Compilers, Phases of a Compiler. Lexical Analysis: The Role of Lexical Analyzer, Input Buffering, A language for specifying Lexical Analyzers (LEX). Syntax Analysis: The role of the Parser, First and Follow, Predictive Parsing, LRParsers-SLR, Canonical LR, LALR.

**Module 5:** **(07 hrs.)**

Syntax-Directed Translation: Syntax-Directed Definition, S-Attributed SDD, L-Attributed SDD, Translation Schemes. Intermediate Code Generation: Intermediate Languages-Graphical Representations, three address code, Implementations.

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### Course Outcomes:

1. Describe the use of finite state machines in modeling and their capacity to identify languages.
2. Provide an overview of Regular languages and context free languages.
3. Develop PDA and Turing machines for the specified language sets.
4. Establish the lexical and syntax analysis phases of a compiler.
5. Model SDD's using Intermediate Representations.

### List of Text / Reference Books:


1. A.V. Aho, R. Sethi, and J.D. Ullman. "Compilers: Principles, Techniques and Tools", Pearson Education,2nd Edition ,2007.
2. Peter Linz, " An introduction to Formal Languages and Automata", 6th Edition, Jones & Bartlett, 2016.
3. K.V.N.Sunitha, N.Kalyani, "Formal Languages and Automata Theory", 1st Edition, TMH, 2010.
4. V Raghavan, "Principals of Compiler Design", TMH Pub.,2017.
5. Louden. "Compiler Construction: Principles and Practice", Cengage Learning,1997
6. C. Holub. "Compiler Design in C" , Prentice-Hall Inc., 1993.
7. Ronald Mak, "Writing compiler & Interpreters", Willey Pub.,3rd Edition,2009.


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## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

| PEC-CL02(A) | Software Engineering | 3L: 0T (3 hrs.) | Credits: 3 |
|---|---|---|---|

## Prerequisite:

## Course Objective:

The purpose of this subject is to cover the underlying concepts and techniques used in Software Engineering & Project Management.

## Course Contents:

**Module 1:** **(08 hrs.)**

**The Software Product and Software Process**

Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics, Feasibility Analysis, Cost Estimation Model.

**Module2:** **(08 hrs.)**

**Requirement Elicitation, Analysis, and Specification**

Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Use case Modeling, System and Software Requirement Specifications, Requirement Validation, Traceability.

**Module 3:** **(08 hrs.)**

**Software Design**

The Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function- oriented Design, SA/SD Component Based Design and Design Metrics.

**Module 4:** **(08 hrs.)**

**Software Analysis and Testing**

Software Static and Dynamic analysis, Code inspections, Software Testing, Fundamentals, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, White-Box Unit Testing and Unit, Testing Frameworks, Integration Testing, System Testing and other Specialized, Testing, Test Plan, Test Metrics, Testing Tools.

**Module 5:** **(08 hrs.)**

**Software Maintenance**

Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Project and Process Planning, Resources Allocations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance (SQA). Project Plan, Project Metrics.

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### Course Outcomes:

1. Decompose the given project in various phases of a lifecycle.
2. Learn to choose an appropriate process model depending on the user requirements.
3. Perform various life cycle activities like Analysis, Design, Implementation, Testing & Maintenance.
4. Know various processes used in all the phases of the product.
5. Apply the knowledge, techniques, and skills in the development of a software product.

### List of Text / Reference Books:


1. Pankaj Jalote," An Integrated Approach to Software Engineering", Narosa Pub, 2005
2. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHILearning,Fouth Edition, 2014.
3. P, S. Pressman "Software Engineering. A Practitioner's Approach" New edition, McGraw Hills,7th edition,2010.
4. Sommerville,"Software Enginerring",Pearson Education, 9th Edition,2011.
5. Richard H.Thayer, "Software Enginerring & Project Managements", WileyIndia
6. Waman S.Jawadekar,"Software Enginerring", TMH,2004.
7. Bob Hughes, M.Cotterell, Rajib Mall "Software Project Management", McGrawHill,Sixth Edition,2017
8. Schwalbe, Kathy "Information Technology Project Management" 8th Edition, 2016.
9. Kieron Conway "Software project Management from concept to development Black Book" Dreamtech Press.
10. Deepak Jain, "Software Engineering principle and practices" Oxford University Press,2008.
11. Bell Douglas "Software Engineering for students" ,Pearson Education.,4th Edition,2005.
12. Kelkar "Software Project Management," PHI Learning,3rd edition 2012.

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## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

| PEC-CL02 (B) | Soft Computing | 3L: 0T (3 hrs.) | Credits: 3 |
|---|---|---|---|

**Prerequisite:** Analysis and Design of Algorithm

## Course Objective:

The objective of this course is to familiarize the students with different soft computing tools to use them to be able to solve complex problems.

## Course Contents:

**Module 1:** **(08 hrs.)**

Introduction to Neural Network: Concept, biological neural network, comparison of ANN with biological NN, evolution of artificial neural network, Basic models, Types of learning, Linear separability, XOR problem, McCulloch-Pitts neuron model, Hebb rule.

**Module2:** **(10 hrs.)**

Supervised Learning: Perceptron learning, Single layer/multilayer, Adaline, Madaline, Back propagation network, RBFN, Application of Neural network in forecasting, data compression and image compression.

**Module 3:** **(10hrs.)**

Unsupervised learning: Introduction, Fixed weight competitive nets, Kohonen SOM, Counter Propagation networks, (Theory, Architecture, Flow Chart, Training Algorithm and applications). Introduction to Convolution neural networks (CNN) and Recurrent neural networks (RNN).

**Module 4:** **(06 hrs.)**

Fuzzy Set: Introduction, Basic Definition and Terminology, Properties and Set-theoretic Operations, Fuzzy Relations, Membership Functions and their assignment, Fuzzy rules and fuzzy Reasoning, Fuzzy if-then Rules, Fuzzy Inference Systems. Application of Fuzzy logic in solving engineering problems.

**Module 5:** **(06 hrs.)**

Genetic Algorithm: Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems like TSP (Travelling salesman problem), Network design routing. Introduction to Ant Colony optimization (ACO) and Particle swarm optimization (PSO).

## Course Outcomes:

1. State basic concept of Neural Network.
2. Illustrate various concepts supervised learning, data and image compression.
3. Describe the concept of unsupervised learning.
4. Apply fuzzy logic concepts to solve real world problems.
5. Design and implement the real world problem through Genetic algorithm.

## List of Text / Reference Books:

1. S.N. Shivnandam, “Principle of soft computing”, Wiley.
2. S. Rajshekaran and G.A.V. Pai, “Neural Network, Fuzzy logic And Genetic Algorithm”, PHI.
3. Jack M. Zurada, “Introduction to Artificial Neural Network System” JAico Publication.
4. Simon Haykins, “Neural Network- A Comprehensive Foundation”
5. Timothy J.Ross, “Fuzzy logic with Engineering Applications”, McGraw-Hills.

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## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

| PEC-CL02 (C) | Computer Vision | 3L: 0T (3 hrs.) | Credits: 3 |
|---|---|---|---|

**Prerequisite:** Basic Linear Algebra, Probability, Calculus, Basic idea of machine learning and its algorithm

### Course Objective:

To gain knowledge about the vision sense of Machine Learning i.e. computer vision & to gain expertise in the various aspects of Computer Vision.

### Course Contents:

**Module 1:** **(08 hrs.)**

Machine vision systems, introduction to low, mid and high level vision, low and mid-level image processing, edge detection, image segmentation, image and texture features Camera geometry, object to image geometric transformations, orthographic and perspective view transformations, camera calibration, Intro to OpenCV.

**Module 2:** **(08 hrs.)**

Binocular vision system, epipolar geometry, 3D scene reconstruction, recovering shape from stereo Human vision structure, neurovisual model, scale space representation Motion estimation and tracking, active contours, recovering shape from motion, video processing Reflectance map and photometric stereo, surface reflectance model, recovering albedo and surface orientation, recovering shape from shading.

**Module 3:** **(08 hrs.)**

Machine learning for computer vision, Classification models for vision, deep learning architectures for vision, Model based recognition system Object recognition, recognition of arbitrary curved object sensed either by stereo or by range sensor, Recognition under occlusion, Aspect graph of an arbitrary 3D object viewed from different directions, Recognition of 3D objects based on 2D projections.

**Module 4:** **(08 hrs.)**

Image Manipulation & Processing: Formation, Storing & Converting images, Gray scaling, Color spaces, histogram representation & drawing on images. Image Transformations: Translation, rotation, pyramids, operations- blurring sharpening, thresholding; Segmentation & Contours.

**Module 5:** **(08 hrs.)**

Object Detection: Feature Description Theory, finding corners, image feature gathering, oriented gradients, HAAR cascade classifiers, face & eye detection, face analysis & filtering, merging faces.

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### Course Outcomes:

1. Understanding the introductory concepts of computer vision.
2. Learning about Binocular vision system.
3. Studying ML applications of computer vision.
4. Working on image processing & functions.
5. Getting to know object detection & face analysis.

### List of Text / Reference Books:


1. Computer Vision, A Modern Approach, David Forsyth, et al., Prentice Hall Pearson, 2015.
2. Computer Vision: Algorithms and Applications, Richard Szeliski, Springer 2011.
3. Multiple View Geometry in Computer Vision, Richard Hartley, et al., Andrew Zisserman, Cambridge University Press, 2004.
4. Robot Vision, B.K.P. Horn, MIT Press, Cambridge, 1986.

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## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

| PEC-CL02 (D) | Cryptography and Network Security | 3L: 0T (3 hrs.) | Credits: 3 |
|---|---|---|---|

**Prerequisite:** Computer Network, Operating System

## Course Objective:

1. Understand fundamental security principles and cryptographic techniques, including various types of attacks and encryption methods.
2. Master advanced cryptographic algorithms, network security protocols, and practical applications through real-world case studies.

## Course Contents:

**Module 1:** **(08 hrs.)**

Introduction to Security, The Need for Security, Security Approaches and Principles, Types of Security Attacks, Introduction to Cryptography, Plain Text and Cipher Text, Substitution and Transposition Techniques, Encryption and Decryption Processes, Symmetric and Asymmetric Key Cryptography.

**Module 2:** **(08 hrs.)**

Symmetric Key Ciphers, Block Cipher Principles, Overview of DES, AES, Blowfish, RC5, IDEA Block Cipher Operations, Asymmetric Key Ciphers, Principles of Public Key Cryptosystems, RSA Algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange.

**Module 3:** **(08 hrs.)**

Cryptographic Hash Functions, Message Authentication and Secure Hash Algorithm (SHA-512) Message Authentication Codes: HMAC, CMAC, Digital Signatures and Elgamal Digital Signature Scheme, Key Management and Distribution, Symmetric Key Distribution Using Symmetric and Asymmetric Encryption, Distribution of Public Keys, Kerberos, Public Key Infrastructure (PKI)

**Module 4:** **(08 hrs.)**

Transport-Level Security, Web Security Considerations, Secure Socket Layer (SSL) and Transport Layer Security (TLS), HTTPS, Secure Shell (SSH), Wireless Network Security, Wireless Security Overview, Mobile Device Security, IEEE 802.11 Wireless LAN Security

**Module 5:** **(08 hrs.)**

E-Mail Security, Pretty Good Privacy (PGP), S/MIME, IP Security, IP Security Overview and Architecture, Case Studies on Cryptography and Security: Secure Multiparty Computation, Virtual Elections, Single Sign-On (SSO)

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### Course Outcomes:

1. Describe the importance of security and the principles of cryptography.
2. Apply symmetric and asymmetric key cipher techniques.
3. Explain cryptographic hash functions, authentication codes, and digital signatures.
4. Identify transport-level and wireless network security protocols.
5. Implement email and IP security measures and analyze cryptographic case studies for real-world applications.

### List of Text / Reference Books:


1. "Cryptography and Network Security: Principles and Practice" by William Stallings
2. "Applied Cryptography: Protocols, Algorithms, and Source Code in C" by Bruce Schneier
3. "Network Security Essentials: Applications and Standards" by William Stallings
4. "E-Mail Security: How to Keep Your Electronic Messages Private" by Bruce Schneier
5. "IPsec: The New Security Standard for the Internet, Intranets, and Virtual Private Networks" by Naganand Doraswamy and Dan Harkins
6. "Cryptographic Hash Functions" by B. Preneel

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## Bachelor of Technology (B.Tech.)

| IOC-CL02(A) | Scientific Aptitude | 3L: 0T (3 hrs.) | Credits: 3 |
|---|---|---|---|

### Prerequisite:

### Course Objective:

This course aims to sensitize students with the gamut of skills which facilitate them to enhance their employability quotient.

### Course Contents:

**Module 1:** **(08 hrs.)**

Number System, Percentage, Ratio and Proportion, Partnership, Profit & Loss, Simple & compound Interest.

**Module 2:** **(08 hrs.)**

Allegation & Mixture, Average, Time &Distance, Time and Work, Mensuration 2D & 3D, Permutation and Combination.

**Module 3:** **(08 hrs.)**

Probability, Co-ordinate Geometry, Inequalities, Functions, Progressions, Set Theory, Quadratic equations, Surds.

**Module 4:** **(08 hrs.)**

Coding Decoding, Sitting Arrangements, Data sequence/Calendars, Direction Sense Test, Blood Relation.

**Module 5:** **(08 hrs.)**

Syllogism, series, Analogy Classification, Clocks, Statements and Arguments, Puzzle Test, Cubes and dice.

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### Course Outcomes:

1. Understand the basic concepts of quantitative ability.
2. Applying basic mathematics skills to interpret data, draw conclusions, and solve problems.
3. Developing proficiency in numerical reasoning.
4. Understand the basic concepts of logical reasoning Skills.
5. Develop the puzzle solving skills.

### List of Text / Reference Books:


1. R.S. Aggarwal, "Quantitative Aptitude",S. Chand Publication,RevisedEdition,2018.
2. M. Tyra, "Magical Book on Quicker Maths", BSC Publishing Co PvtLtd,2018.
3. K.Kundan,"MagicalBookSeries:DataInterpretation",BSCPublishingCoPvtLtd,2012.
4. H.William Dettmer, "The Logical Thinking process", Productivity Press(India)Ltd.,2001.
5. Aditi Agarwal, "An expert guide to problem solving: with practical examples", Create space Independent Pub,2016.
6. George J Summers, "The Great Book of Puzzles &Teasers",JaicoPublishing House,1989.

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| PCC-LC-CL 13 (P) | Natural Language Processing Lab | 02P (4 hrs.) | Credits: 2 |
|---|---|---|---|

### Prerequisite:

### Course Objective:

To introduce solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities

### Course Contents:

**Module 1:**

Introduction to Text Processing, Basic String Operations in Python, Tokenization Techniques, Understanding Language Models, Basic Techniques for Word Generation,

**Module2:**

Introduction to Morphology in NLP, Stemming and Lemmatization Techniques, Understanding N-Gram Models, Applications of N-Grams in NLP

**Module 3:**

Syntactic Processing: Introduction to POS Tagging, Techniques and Tools for POS Tagging, Introduction to Named Entity Recognition, Techniques and Applications of NER

**Module 4:**

Probabilistic Models in NLP: Understanding the Viterbi Algorithm, Applications of the Viterbi Algorithm in NLP, Introduction to Hidden Markov Models, Applications of HMM in NLP

**Module 5:**

Advanced Topics and Applications: Integration of NLP Techniques, Real-world Applications of NLP Case Studies and Projects

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### Course Outcomes:

1. Describe basic concepts of SQL and its data type.
2. Apply data definition language command and analyze its output.
3. Apply data manipulation language command and analyze its output.
4. Apply data control language command, PLSQL and analyze its output.
5. Understand the fundamentals of MongoDB, including its architecture and core concepts, and perform basic CRUD operations to manage databases and collections within a NoSQL environment.

### List of Practical's:

1. Write a program on Word Analysis.
2. Write a program on Word Generation.
3. Write a program on Morphology.
4. Write a program on N-Grams.
5. Write a program on Part of Tagging.
6. Write a program on Named Entity Recognition (NER).
7. Write a program on Viterbi Algorithm.
8. Write a program on Hidden Markov Model.
9. Prepare a Case Study or Project using NLP Techniques.

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## Bachelor of Technology (B.Tech.)

| PCC-LC-CL14 (P) | Data Analytics Using Tools (PowerBI/Tableau etc.) | 02P (4 hrs.) | Credits: 2 |
|---|---|---|---|

## Prerequisite:

## Course Objective:

1. Master the fundamentals of PowerBI/Tableau for data analytics, from setup to connecting various data sources and preparing data for analysis.
2. Develop proficiency in creating insightful visualizations and interactive dashboards using advanced techniques and analytical tools in PowerBI/Tableau.

## Course Contents:

**Module 1:**

Overview of Data Analytics and Visualization Tools, Installation and Setup of PowerBI / Tableau Getting Started with the Interface, Connecting PowerBI/Tableau to Various Data Sources (CSV, Excel, SQL, etc.), Importing and Preparing Data for Analysis

**Module2:**

Data Cleaning and Transformation in PowerBI/Tableau: Techniques for Cleaning and Preparing Data, Data Transformation Functions and Tools, Creating Calculated Fields and Columns: Introduction to Calculated Fields and Columns, Using Formulas and Functions for Data Transformation

**Module 3:**

Creating Basic Visualizations: Overview of Basic Visualization Types (Bar Chart, Line Chart, Pie Chart, etc.), Building Simple Visualizations in PowerBI/Tableau, Using Filters and Slicers: Applying Filters and Slicers to Visualizations, Enhancing Interactivity of Reports

**Module 4:**

Creating Advanced Visualizations: Advanced Visualization Techniques (Heat Maps, Tree Maps, Scatter Plots, etc.), Customizing Visualizations for Better Insights, Building Dashboards: Introduction to Dashboards, Combining Multiple Visualizations into a Dashboard

**Module 5:**

Performing Data Analysis: Using Analytical Tools and Functions in PowerBI/Tableau, Conducting Descriptive and Inferential Analysis, Exporting and Publishing Reports, Sharing Reports with Stakeholders

# IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)Scheme Based on AICTE Flexible Curriculum

## Department of Computer Science & Engineering– AIML

## Bachelor of Technology (B.Tech.)

### Course Outcomes:

1. Able to Set up and connect data in PowerBI/Tableau for effective analysis.
2. Student can Clean and transform data in PowerBI/Tableau for meaningful insights.
3. Able to Create basic visualizations with filters and slicers for interactive data representation.
4. Customize advanced visualizations and integrate them into dashboards for thorough data exploration.
5. Use analytical tools in PowerBI/Tableau for descriptive and inferential analysis, enabling insightful reporting.

### List of Practical's:

1. Install PowerBI/Tableau and explore the interface.
2. Connect to different data sources and import data into PowerBI/Tableau.
3. Perform data cleaning and transformation on a sample dataset.
4. Create calculated fields and columns in PowerBI/Tableau.
5. Create basic visualizations for a given dataset.
6. Apply filters and slicers to visualizations in PowerBI/Tableau.
7. Create advanced visualizations in PowerBI/Tableau.
8. Build a dashboard with multiple visualizations in PowerBI/Tableau.
9. Perform data analysis on a given dataset using PowerBI/Tableau.
10. Publish and share a report created in PowerBI/Tableau.