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(Scheme A)

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme			Credits
				L	T	P	
1.	PEC	CI04	Professional Elective Course-IV	3	-	-	3
2.	PEC	CI05	Professional Elective Course-V	3	-	-	3
3.	SBC	CI04(P)	Data Analytics (Tableau/PowerBi)	-	-	4	2
4.	PROJ	CI07 (A)	Major Project-II	-	-	16	8
						Total Credits	16

(Scheme B)

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme			Credits
				L	T	P	
1.	PEC	CI04	Professional Elective Course-IV	3	-	-	3
2.	PEC	CI05	Professional Elective Course-V	3	-	-	3
3.	SBC	CI04(P)	Data Analytics (Tableau/PowerBi)	-	-	4	2
4.	PROJ	CI07 (B)	Internship and Project (Industry/Corporate/Academia)	-	-	16	8
						Total Credits	16

Note: In Eighth Semester, students may opt for 'SCHEME A' or 'SCHEME B'.

Professional Elective Course-IV	Professional Elective Course-V
CI04(A) Wireless and Mobile Computing	CI05(A) Big Data and Hadoop
CI04(B) Bio Informatics	CI05(B) Soft Computing
CI04(C) Digital Image Processing	CI05(C) Quantum Computing
CI04(D) Agile Software Development	CI05(D) Semantic Web and Ontologies

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PEC-CI04(A)	Wireless and Mobile Computing	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

The objective of the Wireless and Mobile Computing course is to provide students with a fundamental understanding of wireless communication technologies and mobile computing systems. It covers wireless network architectures, mobility management, communication protocols, and standards like GSM, Wi-Fi, and Bluetooth. The course also introduces mobile application development and addresses key challenges such as security, power efficiency, and quality of service in mobile environments.

Course Contents: (40 hrs.)

Module 1: (8hrs.)

Review of traditional networks: Review of LAN, MAN, WAN, Intranet, Internet, and interconnectivity devices: bridges, Routers etc. Review of TCP/IP Protocol Architecture: ARP/RARP, IP addressing, IP Datagram format and its Delivery, Routing table format, ICMP Messages, Subnetting, Supernetting and CIDR, DNS. NAT: Private addressing and NAT, SNAT, DNAT, NAT and firewalls, VLANS: Concepts, Comparison with Real LANS, Type of VLAN, Tagging, IPV6: address structure, address space and header.

Module 2: (10hrs.)

Study of traditional routing and transport: Routing Protocols: BGP- Concept of hidden network and autonomous system, An Exterior gateway protocol, Different messages of BGP. Interior Gateway protocol: RIP, OSPF. Multiplexing and ports, TCP: Segment format, Sockets, Synchronization, Three Way Hand Shaking, Variable window size and Flow control, Timeout and Retransmission algorithms, Connection Control, Silly window Syndrome. Example of TCP: Taho, Reno, Sack etc. UDP: Message Encapsulation, Format and Pseudo header.

Module 3: (10hrs.)

Wireless LAN: Transmission Medium For WLANs, MAC problems, Hidden and Exposed terminals, Near and Far terminals, Infrastructure and Ad hoc Networks, IEEE 802.11- System arch, Protocol arch, Physical layer, Concept of spread spectrum, MAC and its management, Power management, Security. Mobile IP: unsuitability of Traditional IP; Goals, Terminology, Agent advertisement and discovery, Registration, Tunneling techniques. Ad hoc network routing: Ad hoc Network routing v/s Traditional IP routing, types of routing protocols, Examples: OADV, DSDV, DSR, ZRP etc.

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Module 4: **(6hrs.)**

Mobile transport layer: unsuitability of Traditional TCP; I-TCP, S-TCP, M-TCP. Wireless Cellular networks: Cellular system, Cellular networks v/s WLAN, GSM – Services, system architecture, Localization and calling, handover and Roaming.

Module 5: **(6hrs.)**

Mobile Device Operating Systems: Special Constraints & Requirements, Commercial Mobile Operating Systems. Software Development Kit: iOS, Android etc. MCommerce: Structure, Pros &Cons, Mobile Payment System, Security Issues.

Course Outcomes:

1. Design and create traditional networks.
2. Understand the different issues in MAC and routing issues in multi hop wireless and ad-hoc networks and existing solutions for the same.
3. Evaluate the transport layer issues in wireless networks due to error's and mobility of nodes and understand existing solutions for the same.
4. Explain the architecture of GSM.
5. Discuss the services, emerging issues and future trends in M-Commerce.

List of Text / Reference Books:

1. Comer, "Internetworking with TCP/ IP Vol-I", 5th edition, Addison Wesley, 2006.
2. Jochen Schiller "Mobile communication", 2nd edition, Pearson education, 2008.
3. W. Richard Stevens, "TCP/IP Illustrated Vol-I", Addison-Wesley.
4. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education.
5. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer.
6. Android Developers: http://developer.android.com/index.html.
7. Apple Developer : https://developer.apple.com/
8. Windows Phone Dev Center: http://developer.windowsphone.com.
9. BlackBerry Developer: http://developer.blackberry.com/.

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PEC-CI04(B)	Bio Informatics	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

The course has been designed to be an entry level in Bioinformatics. It is introductory in nature and will provide an overview of the concepts and practices in Bioinformatics. The course structure has been designed such that students will acquire skills required to become Assistant Programmer/Technical Assistant in Bioinformatics. It would also help students to acquire a good foundation to take up further studies.

Course Contents: (40 hrs.)

Module 1: **(8hrs.)**

Introduction: Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA & RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

Module 2: **(8hrs.)**

Bioinformatics Databases & Image Processing: Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

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

Sequence Alignment and database searching: Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequences Alignment

Module 4: **(8hrs.)**

Gene Finding and Expression: Cracking the Genome, Biological decoder ring, finding genes through mathematics & learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, mining the Gene Expression Data

Module 5: **(8hrs.)**

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Proteomics & Problem solving in Bioinformatics: Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA & Protein sequences, Strategies and options for similarity search, flowcharts for protein structure prediction

Course Outcomes:

1. To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
2. Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
3. Explain about the methods to characterize and manage the different types of Biological data.
4. Classify different types of Biological Databases.
5. Introduction to the basics of sequence alignment and analysis.

List of Text / Reference Books:

1. To find information in online databases.
2. To retrieve the sequence of the Human keratin protein from UniProt database and to interpret the results.
3. To retrieve the sequence of the Human keratin protein from Genbank database and to interpret the results.
4. To find the similarity between sequences using BLAST.
5. To find the similarity between sequences using FASTA
6. To align more than two sequences and find out the similarity between those sequences using ClustalW.

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PEC-CI04(C)	Digital Image Processing	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

1. Describe and explain basic principles of digital image processing.
2. Design and implement algorithms that perform basic image processing (e.g. noise removal and image enhancement).
3. Design and implement algorithms for advanced image analysis (e.g. image compression, image segmentation).
4. Assess the performance of image processing algorithms and systems.

Course Contents: (40 hrs.)

Module 1: **(6hrs.)**

Digital Image fundamentals, a simple image model, Sampling and Quantization. Relationship between pixels, Imaging geometry, Image acquisition systems, Different types of digital images

Module 2: **(8hrs.)**

Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Hadmord transformation, Discrete Cosine transformation

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

Image enhancement, Filters in spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, Nedion filtering, Low pass filtering, Image sharpening by High pass filtering

Module 4: **(10hrs.)**

Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder, Error free compression, Lossy Compression schemes. JPEG Compression standard, Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques

Module 5: **(8hrs.)**

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Mathematical morphology- Binary, Dilation, crosses, Opening and closing, simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation

Course Outcomes:

1. State the Image representation and modeling.
2. Describe the various Fourier transformation techniques.
3. Identify the various Image enhancements and filter techniques.
4. Recognize the Image encoding and segmentation techniques
5. Illustrate the various morphology operations.

List of Text / Reference Books:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing Pearson.
2. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab – TMH.
3. Sonka, Digital Image Processing & Computer Vision, Cengage Learning
4. Jayaraman, Digital Image Processing, TMH.
5. Pratt, Digital Image Processing, Wiley India

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PEC-CI04(D)	Agile Software Development	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

To learn best practices and methods of software development

Course Contents: (40 hrs.)

Module 1: **(8hrs.)**

Fundamentals of Agile Process: Introduction and background, Agile Manifesto and Principles, Stakeholders and Challenges, Overview of Agile Development Models: Scrum, Extreme Programming, Feature Driven Development, Crystal, Kanban, and Lean Software Development.

Module 2: **(8hrs.)**

Agile Projects: Planning for Agile Teams: Scrum Teams, XP Teams, General Agile Teams, Team Distribution; Agile Project Lifecycles: Typical Agile Project Lifecycles, Phase Activities, Product Vision, Release Planning: Creating the Product Backlog, User Stories, Prioritizing and Estimating, Creating the Release Plan; Monitoring and Adapting: Managing Risks and Issues, Retrospectives.

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

Introduction to Scrum: Agile Scrum Framework, Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum, Scrum Case Study.

Module 4: **(8hrs.)**

Introduction to Extreme Programming (XP): XP Lifecycle, The XP Team, XP Concepts: Refactoring, Technical Debt, Timeboxing, Stories, Velocity; Adopting XP: Pre-requisites, Challenges; Applying XP: Thinking- Pair Programming, Collaborating, Release, Planning, Development; XP Case Study.

Module 5: **(8hrs.)**

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Agile Software Design and Development: Agile design practices, Role of design Principles, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control; Agility and Quality Assurance: Agile Interaction Design, Agile approach to Quality Assurance, Test Driven Development, Pair programming: Issues and Challenges.

Course Outcomes:

1. Describe the fundamental principles and practices associated with each ofthe agile development methods.
2. Compare agile software development model with traditional development models and identify the benefits and pitfalls.
3. Use techniques and skills to establish and mentor Agile Teams for effective software development.
4. Apply core values and principles of Agile Methods in software development.
5. Evaluate project performance and process improvement through Agile metrics and feedback cycles.

List of Text / Reference Books:

1. Robert C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.
2. Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most PopularAgile Process, Addison Wesley, 2012.
3. James Shore and Shane Warden, The Art of Agile Development, O'Reilly Media, 2007.
4. Craig Larman, ―Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
5. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson, 2001.
6. Cohn, Mike, Agile Estimating and Planning, Pearson Education, 2006.
7. Cohn, Mike, User Stories Applied: For Agile Software Development Addison Wisley, 2004.

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PEC-CI05(A)	Big Data and Hadoop	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

1. Provide an understanding of Big Data concepts, challenges, and tools.
2. Introduce Hadoop ecosystem and its core components like HDFS and MapReduce.
3. Enable students to develop solutions using Hadoop for real-time big data problems.
4. Familiarize with tools like Hive, Pig, and HBase for big data analytics.
5. Expose students to the practical use cases of big data in various industries.

Course Contents: (40 hrs.)

Module 1: **(8hrs.)**

Introduces Big Data concepts, its characteristics (5 Vs), challenges, and how it differs from traditional systems, along with real-world applications in industries like healthcare and finance.

Module 2: **(8hrs.)**

Covers Hadoop architecture, including HDFS for distributed storage, YARN for resource management, and the overall functioning of a Hadoop cluster with fault tolerance.

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

Focuses on MapReduce programming, explaining the map and reduce phases, and teaching how to write basic MapReduce jobs with performance tuning.

Module 4: **(8hrs.)**

Explores Hadoop ecosystem tools like Pig (data flow scripting), Hive (SQL-like querying), HBase (NoSQL storage), and introduces Sqoop and Flume for data integration.

Module 5: **(8hrs.)**

Discusses Big Data applications through case studies, an introduction to Spark, ethical issues, and includes a mini-project to apply the learned concepts.

Course Outcomes:

1. Define Big Data and describe its characteristics, challenges, and applications.

2. Understand and explain Hadoop architecture including HDFS and MapReduce.
3. Develop MapReduce programs for parallel processing of large data sets.
4. Use Hadoop ecosystem tools like Hive, Pig, and HBase for data analytics.
5. Analyze case studies and real-world applications using Big Data technologies.

List of Text / Reference Books:

1. Tom White, Hadoop: The Definitive Guide, 4th Edition, O'Reilly Media.
2. Vignesh Prajapati, Big Data Analytics with R and Hadoop, Packt Publishing.
3. Chuck Lam, Hadoop in Action, Manning Publications.
4. Arshdeep Bahga, Vijay Madisetti, Big Data Science & Analytics: A Hands-On Approach, Universities Press.
5. Alex Holmes, Hadoop in Practice, Manning Publications.
6. Michael Minelli, Michele Chambers, Big Data, Big Analytics, Wiley.

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PEC-CI05(B)	Soft Computing	3L: 0T: 0P (3 hrs.)	3 credits

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: (40 hrs.)

Module 1: **(8hrs.)**

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.

Module 2: **(6hrs.)**

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: **(8hrs.)**

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: **(8hrs.)**

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: **(10hrs.)**

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).

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Course Outcomes:

1. Understand concept of ANN and explain the XOR problem.
2. Use supervised neural networks to classify given inputs.
3. Understand unsupervised neural networks for clustering data.
4. Build Fuzzy inference system using concepts of fuzzy logic.
5. Obtain an optimized solution to a given problem using 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 Foudation”
5. Timothy J.Ross, “Fuzzy logic with Engineering Applications”, McGraw-Hills

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PEC-CI05(C)	Quantum Computing	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

The objective of this course is to provide the students an introduction to quantum computation. Much of the background material related to the algebra of complex vector spaces and quantum mechanics is covered within the course.

Course Contents: (40 hrs.)

Module 1: **(6hrs.)**

Introduction to quantum mechanics: Postulates of quantum mechanics, Qubit and quantum states, Vector Spaces, Single Qubit Gates, multiple Qubit Gates, Controlled Gates, Composite Gates, Matrices and operators.

Module 2: **(8hrs.)**

Density operators: Density Operator for a Pure State, Density Operator for a Mixed State,Properties of a Density Operator, Characterizing Mixed States, Completely Mixed States, Partial Trace and Reduced Density Operator. Quantum measurement theory: Distinguishing Quantum States and Measurement,Projective Measurements, Measurements on Composite Systems, Generalized Measurements, Positive Operator Valued Measures.

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

Entanglement: Quantum state entanglement, Bell's Theorem, The Pauli Representation, Using Bell States For Density Operator Representation, Quantum gates and circuits: Single Qubit Gates, The Z Y Decomposition, Basic Quantum Circuit Diagrams, Controlled Gates, Application of Entanglement in teleportation and supper dense coding., Distributed quantum communication Quantum Computer: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

Module 4: **(6hrs.)**

Quantum Algorithm: Hadamard Gates, The Phase Gate, Matrix Representation of Serial and Parallel Operations, Quantum Interference, Quantum Parallelism and Function Evaluation,

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Deutsch -Jozsa Algorithm, Quantum Fourier Transform, Phase Estimation, Shor's Algorithm ,Quantum Searching and Grover's Algorithm

Module 5: **(8hrs.)**

Quantum Error Correction: Introduction, Shor code, Theory of Quantum Error Correction, Constructing Quantum Codes, Stabilizer codes, Fault Tolerant Quantum Computation, Entropy and information –Shannon Entropy, Basic properties of Entropy, on Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.

Course Outcomes:

1. Understand the fundamental principles of quantum mechanics relevant to computing.
2. Differentiate between classical and quantum computation models.
3. Apply quantum logic gates and circuits to simple computational problems.
4. Analyze basic quantum algorithms like Deutsch-Jozsa, Grover's, and Shor's algorithm.
5. Evaluate the potential and limitations of quantum computing in real-world applications.

List of Text / Reference Books:

1. Quantum Computing Explained: David McMahon, Wiley Interscience (IEEE Computer Science).
2. Quantum Computing without Magic Devices: Zdzislaw Meglicki; PHI.
3. Quantum Computation and Quantum Information: M.A. Nielsen & Isaac L. Chuang, Cambridge University Press.
4. Quantum Computing and communications: An Engineering Approach: Sandor Imre and Ferenc Balazs, Wiley.

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PEC-CI05(D)	Semantic Web and Ontologies	3L: 0T: 0P (3 hrs.)	3 credits

Course Objective:

1. To learn Web Intelligence and Knowledge Representation for the Semantic Web
2. To learn Ontology Engineering
3. To learn Semantic Web Applications, Services and Technology
4. To understand the role of ontology and inference engines in semantic web

Course Contents: (40 hrs.)

Module 1: **(8hrs.)**

Semantic Web: Building Models , Calculating with knowledge, Exchanging Information, Semantic Web Technologies ,Types of Web :Smart Web & Dumb Web, Applications ,Semantic Data ,Search Engine for Semantic Web

Module 2: **(8hrs.)**

Semantic Modeling: Modeling for human communication, Explanation and prediction, Mediating Variability: Variation & Classes, Variation & Layers, and Expressivity in Modeling.

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

Resource Description Language RDF : Introduction , Advanced features , simple ontologies in RDF Schema , encoding of special data structures, RDF formal semantics ,syntactic reasoning with deduction rules ,Distributing data across web , Managing data from multiple sources .

Module 4: **(8hrs.)**

Web Ontology Language OWL: OWL syntax and Intuitive semantics, OWL species, Owl formal semantics: Description Logics, Model-Theoretic Semantics of OWL, And Automated reasoning with OWL, Ontology Matching and Distributed Information.

Module 5: **(8hrs.)**

Semantic Web Application Architecture: RDF Parser/Serializer, RDF store: RDF data standards and Interoperability of RDF stores, RDF query engines, SPARQL: Query language for RDF, conjunctive Queries for OWL DL, RDF backed web portals, Data federation. Ontology

Engineering: Constructing Ontologies manually, Reusing Existing Ontologies, Semiautomatic Ontology Acquisition, Ontology Mapping

Course Outcomes:

1. Ability to understand and knowledge representation for the semantic web.
2. Ability to modeling and variability.
3. Design semantic web meta data and RDF schema.
4. Understand Electronic sources for network analysis and different Ontology languages.
5. Evaluate Web- based social network and Ontology.

List of Text / Reference Books:

1. Hitzler, Markus, Rudolph , " Foundations of Semantic Web Technologies" , Chapman & Hall/CRC,2009,ISBN 9781420090505
2. Allemang , Hendler , " Semantic Web for the working Ontologist" 2nd ed. Elsevier Pub
3. Liang Yu , " Introduction to the Semantic Web and Semantic Web Services", Chapman & Hall/CRC
4. Antoniou , Harmelen , "A semantic Web Primer", PHI Pub.
5. Rajendra Akerkar ," Foundations of Semantic Web" , Narosa Publishing ,New Delhi

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SBC-CI04(P)	Data Analytics (Tableau/PowerBi)	0L: 0T: 4P (4 hrs.)	2 credits

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.

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.

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

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 Experiments:

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.

List of Text / Reference Books:

1. Milligan, J. N. (2022). Learning Tableau 2022: Create effective data visualizations, build interactive visual analytics, and transform your organization. Packt Publishing.
2. Powell, B. (2021). Mastering Microsoft Power BI: Expert techniques for effective data analytics and business intelligence. Packt Publishing.
3. Monsey, M., & Sochan, P. (2015). Tableau for Dummies. Wiley.
4. Hyman, J. A. (2022). Power BI for Dummies. Wiley.
5. Nussbaumer Knaflic, C. (2015). Storytelling with Data: A data visualization guide for business professionals. Wiley.
6. Russo, A., & Ferrari, M. (2020). The Definitive Guide to DAX: Business intelligence with Microsoft Excel, SQL Server Analysis Services, and Power BI. Microsoft Press.

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Department of Computer Science &Information Technology
Bachelor of Technology (B.Tech.)
VIII Semester

PROJ-CI07(A)	Major Project-II	0L: 0T: 16P (16hrs.)	8 credits

Course Objectives:

To carry out a small scale project to develop hands-on experience of working in a project. During the course, the student will also develop knowledge of application development platforms and tools (Java /C# dotnet / Visual C++/PHP /Python or any platform of current trend). The students will learn working as a team and basic collaboration and project management skills. The student will also learn about formulating project documentations.

1. Project ideas and proposal guidance (4 hours)

2. Application development (10 hours)

1. Visual programming (object oriented)
    1. Language basics
    2. Frameworks and APIs
2. Programming basics and design patterns

3. Project management, team work and collaboration (6 hours)

1. Project management techniques
2. Collaborative development environment

4. Project guidance & Project work (20 hours)

5. Project documentation guidance (3 hours)

Course Outcome:

1. Understanding the problem identification process and design a proposal for particular problem handling.
2. Design a solution model using any programming language.
3. Learn about different types of project management techniques.
4. Develop a complete project with deployment.
5. Learn about team work and documentation process.

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PROJ-CI07(B)	**Internship and Project (Industry/Corporate/Academia)**	**0L: 0T: 16P (16hrs.)**	**8 credits**

Course Outcome:

1. To explore career alternatives prior to graduation.
2. To develop communication, interpersonal and other critical skills in the job interview process.
3. To assess interests and abilities in their field of study.
4. To identify, write down, and carry out performance objectives related to their job assignment.
5. To integrate theory and practice.