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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

SEMESTER V

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
01	PC	D85PC12	Automata Theory and Compiler Design	3	0	0	3	40	60	100
02	PC	D85PC13	Machine Learning	3	0	0	3	40	60	100
03	HS		Business Intelligence	3	0	0	3	40	60	100
04	PE	D85PE1	Professional Elective I 1. Digital Image Processing 2. Distributed Database 3. Mining Massive Datasets	3	0	0	3	40	60	100
05	PE	D85PE2	Professional Elective II 1 Mobile Computing 2 Internet of Things 3 Software Project Management	3	0	0	3	40	60	100
06	PC	D85PC14	Devops	3	0	0	3	40	60	100
07	PC	D85PC15	Devops lab	0	0	2	1	40	60	100
08	PC	D85PC16	Machine learning Lab	0	0	2	1	40	60	100
09	MC	D5MCCI	Constitution of India							
TOTAL				**17**	**1**	**4**	**20**			

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

AUTOMATA AND COMPILER DESIGN - D85PC12

Course Objectives

- Introduce the major concepts of formal languages translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.

Course Outcomes:

After completion of the course the student will be able to,

1. Solve the finite state machines for modelling and computing problems.L3
2. Build context free grammars for formal languages.L3
3. Distinguish between decidability and undecidability.L4
4. Organize the knowledge of patterns, tokens & regular expressions for lexical analysis.L3
5. Apply the Acquire skills in using lex tool and design LR parsers L3

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems. Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions. Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma. Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Parse Trees, Ambiguity in Grammars and Languages.

UNIT - III

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of aTuring machine Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines

UNIT - IV

Introduction: The structure of a compiler Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom- Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers.

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UNIT - V

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hop croft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science- Automata languages and computation, Mishra and Chandrashekaran, 2nd Edition, PHI.

REFERENCE BOOKS:

1. Compilers: Principles, Techniques and Tools, Alfred V. Aho, Monica S. Lam, Ravi Sethi, JeffryD. Ullman, 2nd Edition, Pearson.
2. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan,Rama R, Pearson.
3. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
4. lex &yacc– John R. Levine, Tony Mason, Doug Brown, O'reilly
5. Compiler Construction, Kenneth C. Louden, Thomson. Course Technology.

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B. Tech III Year I Semester **L/T/P/C**
3/0/0/3

MACHINE LEARNING- D85PC13

Course Objective:
Understand the fundamental principles , supervised, unsupervised , probability based machine learning techniques and practical applications of machine learning.

Course Outcomes:
After completion of the course the student will be able to,

1. Apply supervised learning techniques and utilize the principles of concept learning and linear discriminates to design effective machine learning systems. L3
2. Implement multi-layer perceptrons and SVM, and apply back propagation and radial basis function techniques to develop solutions for machine learning problems. L3
3. Construct decision trees and apply ensemble learning techniques, including boosting and bagging, to analyze data using both supervised and unsupervised learning methods. L3
4. Implement dimensionality reduction techniques and apply genetic algorithms, including various genetic operators, to optimize machine learning models and solutions. L3
5. Utilize reinforcement learning principles, Markov Chain Monte Carlo methods, and construct graphical models, including Bayesian networks and Hidden Markov Models, to solve complex tracking and decision-making problems. L3

UNIT - I
Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT - II
Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT - III
Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT - IV
Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

Analysis – Independent Component Analysis – Locally Linear Embedding –Isomap– Least Squares Optimization Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms.

UNIT - V

Reinforcement Learning – Overview – Getting Lost Example Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo– Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TEXT BOOKS:

1.Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

REFERENCE BOOKS:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖,First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
4. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

BUSINESS INTELLIGENCE

Course Objective: The main objective is to make the students understand the concept, significance, process of Business Intelligence.

Course outcomes: After completing this subject students will be able to

1. Understand the concept of Business Intelligence and its significance in present scenario.
2. Know the Business Intelligence working process.
3. Able to develop the intelligence model.
4. Able to understand industrial espionage.
5. Able to analyze the modern techniques of crypto analysis.

UNIT 1:

Introduction: Understand Business Intelligence and BI process. The practice of private and public intelligence; Strategies of information gathering, the distinction between intelligence, information and data, concepts of Information asymmetry and competitive advantage.

UNIT 2:

Intelligence – Tripod: The tripod: intelligence, security and counter intelligence, The organizational and academic placement of the intelligence function, The intelligence working process, Intelligence strategies and demands on information gathering.

UNIT 3:

Industry & Company Analysis: The relationship of the industry analysis to the company analysis, The instrumental versus the relational perspective on organizations: the case of personal and relational analysis, Developing the intelligence model and conducting the analysis.

UNIT 4:

Intelligence cycle: Stages of Intelligence Cycle, Required qualifications at different stages of the intelligence cycle, Scope and logic of the language for analysis, Ethical and legal limits in private organizations, Industrial espionage: the fine line of hiring competitor's employees.

UNIT 5:

BI Team and Opportunities: BI Software and its business opportunities. -Technical equipment of intelligence and counterintelligence available to nation states and private organizations. - The theory of modern techniques of crypto analysis. -Managing and organizing for an effective BI Team.

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BOOKS RECOMMENDED:

1. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die by Eric Siegel and Thomas H. Davenport (2013)
2. Precision Marketing: Maximizing Revenue through Relevance by Sandra Zoratti and Lee Gallagher (2012)
3. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics by Bill Franks (2012)
4. Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World by Chuck Hemann and Ken Burbary (2013).

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B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

DIGITAL IMAGE PROCESSING- D85PE1

Course Objective:

- To study the concepts of Digital Image Processing focuses on various image processing methods, algorithms and techniques.

Course Outcomes:

After completion of the course the student will be able to,

1. Applying digital image processing concepts involves using acquired knowledge in new scenarios .L3
2. Analyze images in the spatial domain using various transformation techniques.L4
3. Apply the image restoration and segmentation principles and techniques on digital images .L3
4. Apply the Lossy and Lossless compression techniques on digital images.L4
5. Develop a process to apply image processing techniques on color images.L3

UNIT I DIGITAL IMAGE FUNDAMENTALS

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT II IMAGE ENHANCEMENT

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III IMAGE RESTORATION AND SEGMENTATION

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation-Morphological processing- erosion and dilation.

UNIT IV IMAGE COMPRESSION

Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding –LZW Coding Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V COLOR IMAGE PROCESSING

Color Fundamentals, Color Models, Pseudo color image Processing, Basics of Full Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation

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TEXT BOOKS AND REFERENCES

1. R. C.Gonzalez and R. EWoods, "Digital Image Processing", Pearson Prentice Hall.
2. A. K.Jain, "Fundamentals of Digital Image Processing", PHI.
3. B. Chandra andD.D.Majumder “Digital Image Processing and Analysis”, PHI.
4. S.Jayaraman, S.Esakkirajan and T.Veerakumar, “Digital Image Processing”, Tata McGraw Hill.
5. E.Gose, R. Johnsonbaugh and S.Jost, “Pattern Recognition and Image Analysis”, PHI

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

DISTRIBUTED DATABASES - D88PE1

Course Objectives:

The purpose of the course is to enrich the previous knowledge of database systems and expose the need for distributed database technology to confront the deficiencies of the centralized database systems.

Course Outcomes:

Upon the completion of course the student will be able to

1. Make use of distributed database design strategies in developing applications by understanding distributed database architectures .L3
2. Implement query processing and decomposition using optimization techniques..L3
3. Apply concurrency control mechanisms to implement transaction management..L3
4. Apply reliability concepts and measures on distributed databases and learn to develop parallel database systems..L3
5. Construct data model using object oriented approach..L3

UNIT-1: Introduction

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas. **Distributed DBMS Architecture:** Architectural Models for Distributed DBMS, DDMBS Architecture. **Distributed Database Design:** Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT-2: Query processing and decomposition

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data. **Distributed query Optimization:** Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT-3: Transaction Management

Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic on currency control Algorithms, deadlock Management.

UNIT-4:

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning. **Parallel Database Systems:** Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

UNIT-5:

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing. **Object Oriented Data Model:** Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edition. Asia, 20.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOKS:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition

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B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

MINING MASSIVE DATASETS - D88PE1

Prerequisites:
Students should be familiar with Data mining, algorithms, basic probability theory and Discrete math.

Course Objectives:

- This course will cover practical algorithms for solving key problems, parallel algorithmic techniques, stream processing algorithms and page ranking algorithms in mining of massive datasets.

Course Outcomes:
After completion of the course the student will be able to,

1. Handle massive data using Map Reduce.
2. Develop and implement algorithms for massive data sets and methodologies in the context of data mining.
3. Understand the algorithms for extracting models and information from large datasets
4. Develop recommendation systems.
5. Gain experience in matching various algorithms for particular classes of problems.

UNIT - I

Data Mining-Introduction-Definition of Data Mining-Statistical Limits on Data Mining, Map Reduce and the New Software Stack-Distributed File Systems, Map Reduce, Algorithms Using Map Reduce.

UNIT - II

Similarity Search: Finding Similar Items-Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Distance Measures. Streaming Data: Mining Data Streams-The Stream Data Model , Sampling Data in a Stream, Filtering Streams

UNIT - III

Link Analysis-Page Rank, Efficient Computation of Page Rank, Link Spam Frequent Itemsets-Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream. Clustering-The CURE Algorithm, Clustering in Non-Euclidean Spaces, Clustering for Streams and Parallelism

UNIT - IV

Advertising on the Web-Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Adwords Problem, Adwords Implementation. Recommendation Systems-A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction, The NetFlix Challenge.

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UNIT - V:

Mining Social-Network Graphs-Social Networks as Graphs, Clustering of Social-Network Graphs, Partitioning of Graphs, Simrank, Counting Triangles

TEXT BOOKS:

1. Jure Leskovec, Anand Rajaraman, Jeff Ullman, Mining of Massive Datasets, 3rd Edition.

Reference Books:

1. Jiawei Han & Micheline Kamber, Data Mining – Concepts and Techniques 3rd Edition Elsevier.
2. Margaret H Dunham, Data Mining Introductory and Advanced topics, PEA.
3. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann.

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B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

MOBILE COMPUTING- D85PE2

Course Objective:

Understand mobile computing principles and technologies.

Course Outcomes:

Upon completion of the course, the student will be able to

1. Identify mobile communication principles and functionalities of mobile devices for data dissemination. L3
2. Identify the services and protocols of GSM, and various MAC protocols for wireless communication scenarios. L3
3. Identify he functionalities of IP and Mobile IP network layers and alternative transport layer protocols for specific mobile network scenarios.L3
4. Classify database hoarding , delivery techniques and analyze the context aware and power aware mobile computing techniques for broadcasting the data. L4
5. Identify the principles of MANETs, wireless LANs, wireless application protocols, and application development platforms to make informed decisions in mobile application development. L3

UNIT - I

Mobile Communications: an Overview: Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Data Dissemination, Mobility Management, Security. **Mobile Devices and Systems:** Cellular Networks and Frequency Reuse, Mobile Smart phones, Smart Mobiles, and Systems, Handheld pocket Computers, Handheld Devices, Smart Systems, Limitations of Mobile Devices.

UNIT – II

GSM and other 2G Architectures:

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.**Medium Access Control (MAC):** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA,.

UNIT – III

Mobile IP Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP, VoIP, TCP over 2.5G/3G Mobile Networks **Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

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UNIT – IV

Databases and Mobile Computing: Database Hoarding Techniques, Data Caching, Client-Server Computing for Mobile Computing and Adaptation, Adaptation Software for Mobile Computing, Power-aware Mobile Computing, Context-aware Mobile Computing **Data Dissemination and Systems for Broadcasting:** Classification of Data Delivery Mechanisms, Data Dissemination, Digital Audio Broadcasting (DAB), Digital Video Broadcasting.

UNIT - V

Mobile Adhoc Networks (MANETs): Introduction to Mobile Ad-hoc Network, MANET, Routing and Routing Algorithms **Mobile Wireless Short-Range Networks and Mobile:** Wireless LAN, 802.11 Architecture, and Protocol Layers, Wireless Application Protocol (WAP), Wireless Application Protocol-WAP 2.0 **Mobile Application Development Platforms**: Windows Mobile and CE, Windows Phone 7, Android, Symbian

TEXT BOOKS:

1. Mobile Computing by Raj Kamal second edition Oxford Higher Education

REFERENCE BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.

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B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

INTERNET OF THINGS - D85PE2

Course Objectives:

Explore the interconnection and integration of the physical world and the cyber space and design & development steps of IoT Devices.

Course Outcomes:

Upon completion of this course students can able to

1. Apply the concepts of IOT emphazing on physical & logical design, communication models and APIs and base line technologies, by using deployment templates and understanding the characteristics.
2. Implement the features of M2M and use of network protocols to communicate among IOT devices.
3. Apply connectivity using protocols and implement the concepts of wireless sensor networks to communicate among IOT devices.
4. Develop Applications using Arduino and Raspberry pi Devices
5. Implement the features of cloud in developing IOT applications

UNIT I

Introduction To Internet of Things: Introduction, physical design of IoT, logical design of IoT-functional blocks, communicational models, communication APIs, IoT enabling technologies, IOT levels & deployment templates, Characteristics of IoT, Applications of IoT, IoT Enablers and Connectivity Layers, Baseline Technologies,, Sensors, Actuators, IoT Components and Implementation, Challenges of IoT.

UNIT II

IoT and M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Origin of SDN, SDN Architecture, Rule Replacement, IoT System Management with NETCONF-YANG: Need for IOT systems management, simple network management protocol, network operator requirements, NETCONF, YANG, IoT system management with NETCONF-YANG,

UNIT III

IoT networking: Connectivity Terminologies, Gateway Prefix Allotment, Impact of Mobility on Addressing, Multihoming, Deviations from regular Web, IoT Identification and Data Protocols. Connectivity technologies: IEEE 80.15.4, ZigBee, 6LoWPAN, RFID, HART and Wireless HART,

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

NFC, Bluetooth, Z-Wave, ISA 10.11AWireless Sensor networks : Components of a Sensor Node, Modes of Detection, Challenges in WSN, Sensor Web.

UNIT IV

ARDUINO: Features of Arduino, Components of Arduino Board, Arduino IDE, Program Elements, Function Libraries, Random Numbers, Interupts. RASPBERRY : Introduction, Architecture, PIN Configuration.

UNIT V

IoT Platforms Design Methodology ,IoT Physical Servers & Cloud Offerings: Cloud Storage Models & Communication APIs,, WAMP-AutoBahn for IoT, Xively Cloud for IoT, Amazon Web Services for IoT.

TEXT BOOKS:

1. Internet of Things by Arshadeep Bagha, Madisetty Vijay, University Press
2. Internet of Things by Jiva jose, Khanna Book Publishing Co. (P) Ltd.

REFERENCE BOOKS:

1. Getting Started with Raspberry Pi, 2nd Edition, Matt Richardson and Shawn Wallance, SPD
2. Internet of Things Principles and Paradigms, Rajkumar Buyya and Amir Vahid Dastjerdi, ELSEVIER

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B.TECH–COMPUTERSCIENCE&ENGINEERING(DATASCIENCE)

B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

SOFTWARE PROJECT MANAGEMENT- D85PE2

Course Objective:
To equip students with the principles, techniques, methods, and tools necessary for model-based management of software projects.

Course Outcomes:
Upon completion of the course, the student will be able to
1. Apply various software development models and economic principles to effectively manage software projects and make informed decisions in real-world project environments. L3
2. Identify the strategies to reduce software product size, improve software processes, enhance team effectiveness, and transition to modern iterative development methodologies. L3
3. Analyze life cycle phases , manage artifacts, and implement model-based software architectures from both managerial and technical perspectives in developing software projects. L4
4. Analyze the software process workflow and apply planning guidelines to effectively organize project tasks and activities. L4
5. Analyze the core metrics, tailor the software development processes and forecast the future trends in software project management. L4

UNIT-I:
Conventional Software Management: The waterfall model, RAD model, Iterative model, Spiral model, Prototype model and COCOMO model, conventional software management performance, **Evolution of Software Economics**: Software Economics, Pragmatic software cost estimation.

UNIT-II:
Improving Software Economics: Improving Software Economics-the old way and the new way, Reducing software product size, Improving software process, Improving team effectiveness, Improving automation, Achieving required quality, Peer inspections.

UNIT-III:
Conventional and Modern software Management: The principles of conventional software engineering, Principles of modern software management, transitioning to an interactive process.

UNIT-IV:
Life Cycle Phases: Engineering and production stages - Inception, Elaboration, Construction, Transition phases. Artifact software process: The artifact sets - Management artifacts, engineering artifacts, programmatic artifacts.

UNIT-V:
Model based software Architectures: A Management perspective and technical perspective.

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TEXTBOOKS:

1. Software Project Management. Walker Royce, Pearson Education.
2. Henrey, "Software Project Management", Pearson.
3. Watts S. Humphrey, Managing the Software Process, 1st Edition,Pearson Education, 2002.

REFERENCEBOOKS:

1. Applied Software Project Management, Andrew Stebian, &Jennifer Greene, O'Reilly2006.
2. Watts S. Humphrey, A Discipline to Software Engineering , 1st Edition, Pearson Education, 2008.
3. Software Engineering Project Management. Richard H. Thayer & Edward Yourdon, Secondedition,WileyIndia,2004.
4. Software Project Management in Practice Pankaj Jalote Pearsoneducation, 2002.

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B.Tech III Year I Semester **L/T/P/C**
3/0/0/3

DEVOPS- D85PC14

Course Objectives:

- Understand the skill sets and high-functioning teams involved in Agile, DevOps and related methods to reach a continuous delivery capability.

Course Outcomes:

1. Apply DevOps principles and methodologies to identify, analyze, and address challenges in software development and delivery processes.L3
2. Apply DevOps principles, implement continuous testing practices, and shape resilient software architecture to enhance business agility in software development models.L3
3. Apply source code control practices, understand the history and roles associated with source code management, and effectively utilize Git-based tools and platforms in project development.L3
4. Analyse complex built systems, demonstrate advanced proficiency in configuring and optimizing Jenkins servers, critically strategize build dependency management, and design sophisticated pipelines for effective system integration.L4
5. Analyze testing types, evaluate test automation, demonstrate proficiency in Selenium for frontend testing and JavaScript for backend integration, apply test-driven development principles, and assess deployment strategies using virtualization, configuration management, and container orchestration.L4

UNIT-I
Introduction to DevOps:

Introduction, Agile development model, DevOps and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, identifying bottlenecks.

UNIT-II
Software development models and DevOps:

DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Micro services and the data tier, DevOps, architecture, and resilience.

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UNIT-III
Introduction to project management:

The need for source code control, the history of source code management, Roles and code, source code management system and migrations, shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV
Integrating the system:

Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Buildslaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V
Testing Tools and Deployment:

Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development. Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker.

TEXTBOOKS:

1. JoakimVerona.,PracticalDevOps,PacktPublishing,2016.

REFERENCEBOOKS:

1. DeepakGaikwad,ViralThakkar.DevOpsToolsfromPractitioner'sViewpoint.Wiley publications.
2. LenBass,IngoWeber,LimingZhu.DevOps:ASoftwareArchitect'sPerspective.AddisonWesley

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B.Tech III Year I Semester **L/T/P/C**
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DEVOPS - LAB- D85PC15

Course Objectives:

Develop a sustainable infrastructure for applications and ensure high scalability. DevOps aims to shorten the software development lifecycle to provide continuous delivery with high-quality.

Course Outcomes:

1. Understand the DevOps tools and software application development L2
2. Apply different project management, integration and development toolsL3
3. Devolop Selenium tool for automated testing of application L3

List of Experiments

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application for exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium

TEXT BOOKS:

1. Joakim Verona., Practical DevOps, Packt Publishing, 2016.

REFERENCE BOOKS:

1. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications.
2. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley.

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B.Tech III Year I Semester **L/T/P/C**
0/0/2/1

MACHINE LEARNING LAB - D85PC16

Course objectives:
This course will enable students to

- Make use of Data sets in implementing the machine learning algorithms and concepts in any suitable language of choice.

Course outcomes: The students should be able to:

- Design Java/Python programs for various Learning algorithms.
- Apply appropriate data sets to the Machine Learning algorithms.
- Identify and apply Machine Learning algorithms to solve real world problems.

List of Experiments

1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

TEXT BOOK:
1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK:
1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

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SEMESTER VI

S.No.	Course Classification	Course Code	Name of the subject	L	T	P	C	I	E	Total
01	PC	D86PC17	Big Data Analytics	3	0	0	3	40	60	100
02	PC	D86PC18	Natural Language Processing	3	0	0	3	40	60	100
03	PC	D86PC19	Deep Learning	3	0	0	3	40	60	100
04	PE	D86PE3	Professional Elective III 1. Information Security 2. Advanced Databases 3. Mobile Application Development	3	0	0	3	40	60	100
05	PE	D86PE4	Professional Elective IV 4. Blockchain Technology 5. Information Retrieval System 6. Computer Vision	3	0	0	3	40	60	100
06	OE		Open Elective I	3	0	0	3	40	60	100
07	PC	D86PC20	Big Data Analytics Lab	0	0	2	1	40	60	100
08	PC	D86PC21	Node JS/ React JS/ Django Lab	0	0	2	1	40	60	100
09	MC	D6MCES	Environmental Studies							
TOTAL				18	0	4	20			

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B.TECH–COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

B.Tech III Year II Semester **L/T/P/C**
3/0/0/3

BIGDATA ANALYTICS - D86PC17

Course objectives:
Understand the tools, technologies & programming languages which is used in day to day analytics cycle

Course outcomes:
Upon completion of course the student will be able to

1. Analyse the characteristic of Bigdata making use of data collection, preparation & visualization.L4
2. Apply Big data patterns in their application to solve problems encountered in the domain of big data analytics.L3
3. Analyse Data Acquisition and Big Data Storage by exploring HDFS,SCALA & SPARK. L3
4. Apply batch analysis applications using Apache resilient distributed datasets and high-level APIs , enabling faster and more interactive data processing compared to traditional Map Reduce L3
5. Make use of Relational and Non-Relational Databases, to develop web application models emphasizing of django framework

UNIT I
Introduction to Big Data: What is Analytics, What is Big Data, Characteristics of Big Data, Domain Specific Examples of Big Data, and Analytics flow for Big Data-Data Collection, Data Preparation, Analysis Types, Analysis Modes, Visualizations, Big Data Stack.

UNIT II
Bigdata Patterns: Analytics architecture components & Design styles-Load Leveling with Queues, Load Balancing with Multiple Consumers, Leader Election, Sharding, CAP, Lambda Architecture, Scheduler Agent Supervisor, Pipes & Filters, MapReduce Patterns.

UNIT III
Big Data Analytics Implementations
Data Acquisition: Data Acquisition Considerations**,** Publish -Subscribe Messaging Frameworks**,** Big Data Collection Systems. **Big Data Storage**: HDFS- Architecture, SCALA & SPARK.

UNIT IV
Batch Analysis: Hadoop and Map Reduce, Hadoop–Map Reduce Examples, Pig, Case Study: Batch Analysis of News Articles, Apache Oozie, and Apache Spark.

UNIT V
Serving Databases and Web frameworks: Relational (SQL) Databases, Non-Relational (NoSQL) Databases, and Python Web Application Framework– Django. **NoSQL**:Key-Value Databases, Document Databases, Column Family Databases, Graph Databases.

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B.TECH–COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

TEXT BOOKS:

1.Big Data Science and Analytics AHands-on Approach. By Arshdeep Bahga,VijayMadisetti

References:

Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services.

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B.Tech III Year II Semester **L/T/P/C**
3/0/0/3

NATURAL LANGUAGE PROCESSING - D86PC18

Course Objectives:

Develop to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

Upon completion of the course the student will be able to

1. Identify sensitivity to linguistic phenomena and an ability to model them with formal grammars. L3
2. Choose proper experimental methodology for training and evaluating empirical NLP systems. L3
3. Compare Manipulate probabilities, construct statistical models over strings and trees L4
4. Compare and contrast estimate parameters using supervised and unsupervised training methods. L4
5. Design, implement, and analyze NLP algorithms; and design different language modelling Techniques. L4

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms.

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues
Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT - IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.

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Bikel and Imed Zitouni, Pearson Publication.

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

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B.Tech III Year II Semester **L/T/P/C**
3/0/0/3

DEEP LEARNING AND NEURAL NETWORK - D86PC19

Course Objective:

- The course will cover the deep learning and its applications to perceptions in different modalities focusing on those relevant for robotics. It will also cover the algorithms for visual perception and procedure for map building. The course deal with simultaneous localization and mapping based techniques and aspects of imaging techniques used in robotic applications.

Course outcomes:

Upon completion of course the student will be able to
1. Understand the concepts of Machine learning L2
2. Understand the concepts of deep learning and Convolution Networks L2
2. Understand the robot perception and cognition.L2
3. Learn the planning of Randomized path for robotic perception.L2
4. Acquire knowledge about localization and mapping techniques.L2

UNIT I

Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges,Motivating Deep Learning.

UNIT II

Deep Feed Forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms. Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT III

Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro scientific Basis for Convolutional Networks.

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UNIT IV

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks and Bidirectional RNN, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long-Term Dependencies, Explicit Memory.

UNIT V

Auto encoders: Under complete Auto encoders, Regularized Auto encoders, Representational Power, Layer Size and Depth, Stochastic Encoders and Decoders, Denoising Auto encoders, Learning Manifolds with Auto encoders, Contractive Autoencoders, Predictive Sparse Decomposition, Applications of Auto encoders.

TEXT BOOKS:

1. Deep Learning, Ian Good Fellow, Yoshua Bengio and Aaron Courville.

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B.TECH–COMPUTER SCIENCE & ENGINEERING (DATASCIENCE)

B.Tech III Year II Semester **L/T/P/C**
3/0/0/3

INFORMATION SECURITY - D86PE3

Course Objective:
To understand and learn the objectives of Network security, Cryptographic algorithms.

Course Outcomes:
After completion of the course student will be able to

1. Make use of security concepts and classical encryption techniques to establish secured communications.L3
2. Implement symmetric and asymmetric key algorithms for designing the security features for transfer of information from one end to another end. L3
3. Apply the features of authentication for acknowledging the two way communication process using message authentication codes.
4. Develop Privacy using SSL and TLS for constructing applications which use web services.
5. Develop security Mechanism across system and IP layers of communication.

UNIT I

Security Concepts

Introduction, security trends, OSI Architecture, security attacks, security services, security mechanisms, AModel for Network Security.

Cryptography Concepts and Techniques: Introduction, Plain Text and cipher text, substitution techniques(Caesar cipher, Playfair cipher, Hill cipher), transposition techniques, steganography.

UNIT II

Symmetric Key Ciphers

Block Cipher principles, DES, AES, Block Cipher Modes of Operation, Stream ciphers, RC4.

Asymmetric Key Ciphers: Principles of public key cryptosystems, RSA algorithm, Difffie-Hellman KeyExchange, Elliptic Curve Cryptography and Arithmetic.

UNIT III

Cryptographic Hash Functions Authentication requirements and Functions, Message Authentication Code, Secure Hash Algorithm (SHA-512), Message authentication codes: HMAC, CMAC, Digital signatures, AUTHENTICATION APPLICATIONS: Kerberos, X.509 Authentication Service Public KeyInfrastructure.

UNIT IV

Web Security: Web security considerations, Secure Socket Layer, and Transport Layer Security, Secure ElectronicTransaction. **E-Mail Security:** Pretty Good Privacy, S/MIME.

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UNIT V

IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management. **System Security:** Intruders, Intrusion Detection, Password Management.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 4th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India,1st Edition.
2. Cryptography and Network Security: Forouzan, Mukhopadhyay, Mc Graw Hill,3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM, Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.

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B.Tech III Year II Semester **L/T/P/C**
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ADVANCED DATABASES - D85PE3

Course Objective:

- To provide a strong foundation in advanced database concepts from an industry perspective.

Course Outcomes:

Upon completion of course the student will be able to

1. Understand the concepts of parallel databases, Object databases, and XML databases.L2
2. Know the significance and concepts of Information retrieval;L2
3. Apply them in implementing transaction management features. L3
4. Learn the concepts of advance transaction processing, advance application development, spatial and temporal data Mobility. L3
5. Learn to address the prelims of security issues over advance database concepts. L3

UNIT I

Database system Architecture: Centralized and client server architecture , parallel systems, distributed systems **Parallel databases:** explores a variety of parallelization techniques, including I/O parallelism, inter query and intra query parallelism, and interoperation and intra operation parallelism. Query optimization, Design of parallel Systems, Parallelism on Multi Core Processors.

UNIT II

Object Based Databases: Complex data types, Structured types and Inheritance in SQL, Table Inheritance, Array and Multi set types in SQL, Object-Identity and Reference types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Oriented versus Object-Relational.

UNIT III

Advance application Development: Performance Tuning, Performance Benchmarks, Other Issues in Application Development, Standardization. **Spatial and Temporal data Mobility:** Motivation, Time in Databases, Spatial and Geo graph Data, Multimedia Databases, Mobility and Personal databases.

UNIT IV

Advanced Transaction Processing: Transaction-Processing Monitors, Transactional Workflows, E-commerce, Main-memory databases, Real-Time Transaction Systems, Long-Duration Transactions.

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UNIT V

Database Security : Introduction to database security issues, Discretionary access control based on granting and revoking privileges; Mandatory access control and role based access control for multilevel security. SQL Injection, Introduction to statistical Database Security, Introduction to flow control, Encryption and Public Key Infrastructures, Privacy issues and preservation, challenges to maintaining database security.

TEXT BOOKS:

1. Database Systems concepts 6th edition silberschatz-korth-surdarshan Tata Mc Graw Hill Publications (Indian Edition)
2. Fundamentals of Database systems seventh edition Pearson Publications by Ramez Elmasri, Shamakanth.B. Navathe

REFERENCE:

1. Distributed Databases Stefeno Ceri & Guiseppe Pelagatti TataMCgrewHill Edition

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B.Tech III Year II Semester **L/T/P/C**
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MOBILE APPLICATION DEVELOPMENT - D86PE3

Course Objective:
To Model and manage mobile application development using a range of methods, designing and develop mobile applications using a chosen application development framework and to evaluate alternative mobile frameworks, and contrast different programming platforms.

Course Outcomes:
Upon completion of course the student will be able to
1. Demonstrate their understanding of the fundamentals of Android operating systems L2
2. Improves their skills of using Android software development tools.L3
3. Demonstrate their ability to develop software with reasonable complexity on mobile platform.L2
4. Demonstrate their ability to deploy software to mobile devices.L2
5. Demonstrate their ability to debug programs running on mobile devices.L2

UNIT - I
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools, Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes, Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes.

UNIT – II
Android User Interface: Measurements – Device and pixel density independent measuring UNIT – s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers, Event Handling – Handling clicks or changes of various UI components.
Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT – III
Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity
Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT – IV
Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

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Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data,

UNIT – V

iOS Programming*:* Apps for a Mobile Platform, iOS Benefits, iOS App Development Essentials, The Application Model., Examining an Objective-C Program., Defining Classes, Using Classes, Objects, Methods, and Variables, Managing Memory, Handling Exceptions, Organizing Program Files, Analyzing Objective-C's Object-Orientation Capabilities.

TEXT BOOKS:

1. Professional Android4 Application Development, Reto Meier, Wiley India, (Wrox), 202
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 203
3. Beginning iOS Programming For Dummies A Wiley Brand

REFERENCE BOOKS:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 203

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B.Tech III Year II Semester **L/T/P/C**
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BLOCK CHAIN TECHNOLOGY - D86PE4

Course Objectives:

To learn the fundamentals of Blockchain and various types of block chain and mechanisms. public block chain system, Private block chain system and consortium blockchain.

Course Outcomes:

Upon completion of course the student will be able to

1. Make use of consensus mechanism to understand decentralization, distribution process and gain insights on blockchain protocols.. L3
2. Implement smart contracts phenomenon to demonstrate public block chain system .L3
3. Develop private, public and hybrid blockchain systems by analysing the ecommerce site as an example.L3
4. Apply the principle of security in blockchain phenomenon and analyze the security measures in the domains of banking and finance, education, health care, real-estate, supply chain .L3
5. Analyze the concepts of block chain using case studies in Retail marketing, banking and financial services, health care and energy utilities. .L4

UNIT-I

Fundamentals of Blockchain: Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future. Blockchain Types and Consensus Mechanism: Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol. Cryptocurrency – Bitcoin, Altcoin and Token: Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrencies, Cryptocurrency Usage.

UNIT-II

Public Blockchain System: Introduction, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain. Smart Contracts: Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart Contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry.

UNIT-III

Private Blockchain System: Introduction, Key Characteristics of Private Blockchain, Need of PrivateBlockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Various Commands (Instructions) in E-commerce Blockchain, Smart

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Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multi chain.

Consortium Blockchain: Introduction, Key Characteristics of Consortium Blockchain, Need of Consortium Blockchain, Hyperledger Platform, Overview of Ripple, Overview of Corda.Initial Coin Offering: Introduction, Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms.

UNIT-IV

Security in Blockchain: Introduction, Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric. Applications of Blockchain: Introduction, Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain In Supply Chain, The Blockchain and IoT. Limitations and Challenges of Blockchain.

UNIT-V

Blockchain Case Studies: Case Study 1 – Retail, Case Study 2 – Banking and Financial Services,Case Study 3 – Healthcare, Case Study 4 – Energy and Utilities. Blockchain Platform using Python: Introduction, Learn How to Use Python Online Editor, Basic Programming Using Python, Python Packages for Blockchain. Blockchain platform using Hyperledger Fabric: Introduction, Components of Hyper ledger Fabric Network, Chain codes from Developer.ibm.com, Blockchain Application Using Fabric Java SDK.

TEXT BOOK:

1. "Blockchain Technology", Chandramouli Subramanian, Asha A. George, Abhilasj K A and Meena Karthikeyan, Universities Press.

REFERENCE BOOKS:

1. Michael Juntao Yuan, Building Blockchain Apps, Pearson, India.
2. Blockchain Blueprint for Economy, Melanie Swan, SPD O'reilly.
3. Blockchain for Business, Jai Singh Arun, Jerry Cuomo, Nitin Gaur, Pearson.

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INFORMATION RETRIEVAL SYSTEMS - D87PE4

Course Objective

Learn to evaluate information retrieval systems

Course Outcomes

Upon completion of course the student will be able to

1. Understand various functionalities and capabilities of Information Retrieval System.L2
2. Analyze the information retrieval Review of basic probability theory.L4
3. Understand Text classification and Naive Bayes.L2
4. Analyze Various Supervised and Unsupervised learning Method.L4
5. Understand search Engine functionality.L2

UNIT-I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT-II

XML retrieval Basic XML concepts , Challenges in XML retrieval , A vector space model for XML retrieval , Evaluation of XML retrieval , Text-centric vs. data-centric XML retrieval Probabilistic information retrieval Review of basic probability theory, The Probability Ranking Principle, The Binary Independence Model, An appraisal and some extensions.

UNIT-III

The text classification problem, Naive Bayes text classification, The Bernoulli model, Properties of Naive Bayes, Feature selection, Evaluation of text classification, Vector space classification, Document representations and measures of relatedness in vector spaces, Rocchio classification, k nearest neighbour, Linear versus nonlinear classifiers, Classification with more than two classes, The bias-variance tradeoff

UNIT-IV

Support vector machines and machine learning on documents Support vector machines: The linearly separable case, Extensions to the SVM model, Issues in the classification of text documents, Machine learning methods in ad hoc information retrieval Flat clustering Clustering in information retrieval, Evaluation of clustering, K-means, Model-based clustering Hierarchical clustering Hierarchical agglomerative clustering, Single-link and complete-link clustering.

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UNIT-V

Web search basics Background and history, Web characteristics, Advertising as the economic model, The search user experience, Index size and estimation, Near-duplicates and shingling
Web crawling and indexes Overview, Crawling, Distributing indexes, Connectivity servers
Link analysis The Web as a graph, Page Rank, Hubs and Authorities.

TEXT BOOKS;

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer
2. An Introduction to Information Retrieval Christopher D. Manning, Prabhakar Raghavan , Hinrich Schütze Cambridge University Press Cambridge, England

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B.Tech III Year II Semester **L/T/P/C**
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COMPUTER VISION - D86PE4

Course Objectives:

- To understand the Fundamental Concepts Related to sources, shadows and shading

Course outcomes:

Upon completion of course the student will be able to

1. Implement fundamental image processing techniques required for computer vision.L3
2. Perform shape analysis and Implement boundary tracking techniques.L4
3. Apply chain codes and other region descriptors.L3
4. Apply Hough Transform for line, circle, and ellipse detections and 3D vision techniques.L3
5. Develop applications using motion related and computer vision techniques.L3

UNIT I

CAMERAS:

Pinhole Cameras, Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases, Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: hotometric Stereo, Inter reflections: Global Shading Models, Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT II

Linear Filters, Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Edge Detection: Noise, Estimating Derivatives, Detecting Edges, Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT III

The Geometry of Multiple Views: Two Views, Stereopsis: Reconstruction, Human Stereposis, Binocular Fusion, Using More Cameras, Segmentation by Clustering:What Is Segmentation?, Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,

UNIT IV

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness, Segmentation and Fitting Using Probabilistic Methods:Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice,Tracking With Linear Dynamic Models:Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples.

UNIT V

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations, Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration,

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Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization,Model- Based Vision:Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

TEXT BOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

REFERENCE BOOKS:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.

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B.Tech III Year II Semester **L/T/P/C**
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BIG DATA ANALYTICS LAB - D86PC20

Course Objective:

The primary objective of the lab course is to provide data science engineering students with practical, hands-on experience in using Scala and Apache Spark for data processing, analysis, and machine learning. Students will gain proficiency in both the Scala programming language and the Spark framework, enabling them to apply these skills to real-world data science challenges.

Course Outcomes:

Upon completion of course the student will be able to

1. Understand Scala& Spark Fundamentals L2
2. Construct how to do Data Manipulation with Spark DataFrames and Machine Learning Implementation with MLlib L3
3. Devolop Real-time Data Processing with Spark Streaming and Integration with Big Data Ecosystem L3

Experiments

1. Introduction to Scala and Spark
   i. Install Scala, Spark, and set up the development environment
   ii. Explore basic Scala syntax, variables, and data types
   iii. Use Spark's interactive shell to execute basic Spark commands in Scala.
2. Scala Functional Programming
   i. Define and use functions in Scala
   ii. Explore higher-order functions and their applications
   iii. Work with immutable collections (List, Set, Map) in Scala
   iv. Perform common operations using Scala's functional programming style
3. Spark RDD Operations
   i. Create RDDs from different data sources
   ii. Perform basic RDD transformations (map, filter, reduce).
   iii. Introduce pair RDDs and perform key-based transformations.
4. Spark DataFrames and SQL
   i. Create and manipulate Spark DataFrames using Scala.
   ii. Perform common DataFrame operations (select, filter, groupBy).
   iii. Write SQL queries with Spark SQL in Scala
   iv. Register and query temporary tables.
5. Machine Learning with MLlib
   i. Implement a linear regression model using MLlib in Scala
   ii. Evaluate the model's performance.
   iii. Build a classification model (e.g., Logistic Regression) using MLlib in Scala
   iv. Evaluate the classification model.

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6. Spark Streaming in Scala
   i. Set up a Spark Streaming application using Scala
   ii. Process and analyze real-time streaming data
   iii. Implement windowed operations on streaming data (e.g., windowed counts).
7. Advanced Spark and Scala Applications
   i. Explore the use of broadcast variables and accumulators in Spark.
   ii. Create and analyze a graph using Spark's GraphX library.
8. Capstone Project
   i. Develop a data science project showcasing data processing, analysis, and machine learning using Spark.

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B.Tech III Year II Semester **L/T/P/C**
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NODE JS/ REACT JS/ DJANGO - D86PC21

Prerequisites: Object Oriented Programming through Java, HTML Basics

Course Objectives:

understanding and mastery of web development concepts and technologies, enabling you to tackle more complex challenges and build higher-quality applications.

Course Outcomes:

Upon completion of course the student will be able to

1. Demonstrate Advanced features of JavaScript and learn about JDBC.L2
2. Develop Server – side implementation using Java technologies Node JS.L3
3. Design a Single Page Application using React.L5

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.

2. Make the above web application responsive web application using Bootstrap framework.

3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.

4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.

5. Develop a java stand alone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.

6. Create an xml for the bookstore. Validate the same using both DTD and XSD.

7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.

8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)

9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.

10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)

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11. For the above application create authorized end points using JWT (JSON Web Token).

12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.

13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js

14. Create a TODO application in react with necessary components and deploy it into github.

Reference Books:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press.