



## **SRI KANYAKA PARAMESWARI ARTS & SCIENCE COLLEGE FOR WOMEN**

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### **Post Graduate Department of Computer Science (Shift – I)**

#### **Program Outcome**

Graduates of the program should be able to:

- PO1:** Excel in presenting their views, reading and writing effectively.
- PO2:** Understand the moral responsibility of their profession in society and environment with professional ethics and technical skills.
- PO3:** Contribute their technical skills to bring solution to the social issues of environmental sustainability.
- PO4:** Acquire the knowledge and importance of updating their subject knowledge with the latest technology of the computer science.

#### **Program Specific Outcomes**

- PSO1:** Acquire in depth knowledge of recent technologies.
- PSO2:** Acquire practical knowledge in distributed and component based application.
- PSO3:** Analyze opportunities to pursue research.
- PSO4:** Posses knowledge in core computing techniques.

# SYLLABUS

**Subject Name: Design And Analysis Of Algorithm**  
**Subject Code: PSD1A**

**Year: I**  
**Semester: I**

**Unit 1:** Introduction - Definition of Algorithm – pseudocode conventions – recursive algorithms – time and space complexity –big-“oh” notation – practical complexities – randomized algorithms – repeated element – primality testing - Divide and Conquer: General Method - Finding maximum and minimum – merge sort.

**Unit-2:** Divide and conquer contd. – Quicksort, Selection, Strassen's matrix multiplication – Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with dead lines – optimal storage on tapes.

**Unit 3:** Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack. Search techniques for graphs – DFS-BFS-connected components – biconnected components.

**Unit 4:** Back Tracking: General Method – 8-queens - Sum of subsets - Graph Coloring – Hamiltonian cycles. Branch and Bound: General Method - Traveling Salesperson problem.

**Unit 5:** Lower Bound Theory: Comparison trees - Oracles and advisory arguments - Lower bounds through reduction - Basic Concepts of NP-Hard and NP-Complete problems.

## **Recommended Texts:**

1. E. Horowitz, S. Sahni and S. Rajasekaran, 2007, Computer Algorithms, 2nd Edition, Universities Press, India.

## **Reference Books**

1. G. Brassard and P. Bratley, 1997, Fundamentals of Algorithms, PHI, New Delhi.
2. A.V. Aho, J.E. Hopcroft, J.D. Ullmann, 1974, The design and analysis of Computer Algorithms, Addison Wesley, Boston.
3. S.E.Goodman and S.T.Hedetniemi, 1977, Introduction to the Design and Analysis of algorithms, Tata McGraw Hill Int. Edn, New Delhi.

## **COURSE OUTCOME**

**CO1:** Discuss sorting algorithms.

**CO2:** Illustrate process of graph coloring.

**CO3:** Describe Traveling salesperson problems.

**CO4:** Illustrate the Lower Bounds through reduction.

**Subject Name: Advanced Java Programming**  
**Subject Code: PSD1B**

**Year: I**  
**Semester: I**

**Unit 1:** Servlet Overview – Servlet life cycle - The Java Web Server – Simple Servlet – Servlet Packages– Using Cookies - - Session Tracking - Security Issues – using JDBC in Servlets – HTML to Servlet Communication - applet to servlet communication.

**Unit 2:** Java Beans: The software component assembly model- The java bean development kit-developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool-JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

**Unit 3:** EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans-EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope

**Unit 4:** RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter-ORB Protocol

**Unit 5:** JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Java mail-Components-Java mail API-Integrating into J2EE-Understanding Java Messaging Services-Introducing Java Transactions.

**Recommended Text:**

1. James McGovern, Rahim , Adatia, Yakor Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi.
2. Herbert Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.
3. Jamie Jaworski, 1999, Java 2 Platform – Unleashed, First Edition, Techmedia-SAMS.

**Reference books:**

1. K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
2. D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston
3. Joseph O’Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
4. T. Valesky, T.C. Valesky, 1999, Enterprise JavaBeans, Addison Wesley.
5. Cay S Horstmann & Gary Cornell, 2013, Core Java Vol II Advanced Features, 9th Edition, Addison Wesley.

**COURSE OUTCOME**

**CO1:** Discuss Servlet Life Cycle.

**CO2:** Distinguish between Java Bean and Enterprise Java Bean.

**CO3:** Describe the Steps to Develop RMI Applications.

**CO4:** Discuss JSP Scripting Elements.

**CO5:** Understand Java Mail API.

**Subject Name: System Software**  
**Subject Code: PSD1C**

**Year: I**  
**Semester: I**

**Unit 1:** Language processors – Language processing activities and fundamentals – Language specification – Development Tools – Data Structures for Language processing- Scanners and Parsers.

**Unit 2:** Assemblers: Elements of Assembly language programming - Overview of the Assembly process - Design of a Two-pass Assembler - A single pass Assembler for the IBM PC.

**Unit 3:** Macros and Macro processors – Macro definition, call and expansion – Nested macro calls – Advanced macro facilities - Design of a macro preprocessor - Compilers: Aspects of compilation.

**Unit 4:** Compilers and Interpreters – Memory allocation - Compilation of Expressions and Control structures - Code optimization – Interpreters.

**Unit 5 :** Linkers: Linking and Relocation concepts – Design of a linker – Self relocating Programs – A linker for MS DOS - Linking for over-lays – loaders - Software tools: Software tools for program development - Editors - Debug monitors - Programming environments – User interfaces.

### **Recommended Texts**

1. D. M. Dhamdhere, 1999, Systems Programming and Operating Systems, Second Revised Edition, Tata McGraw-Hill, New Delhi.

### **Reference Books**

1. L. L. Beck, 1996, System Software An Introduction to System Programming, 3rd edition, Addison-Wesley.

## **COURSE OUTCOME**

**CO1:** Describe Development tools for Language Processor.

**CO2:** Explain pass 2 of Two Pass Assembler.

**CO3:** Illustrate Macro preprocessor.

**CO4:** Design Linker Loader.

**Subject Name: Theoretical Foundations Of Computer Science**  
**Subject Code: PED1A**

**Year: I**  
**Semester: I**

**Unit 1:** Propositions and Compound Propositions – Logical Operations – Truth Tables – Tautologies and Contradictions – Logical Equivalence – Algebra of Propositions – Conditional and Biconditional Statements – Arguments – Logical Implication – Quantifiers – Negation of Quantified Statements – Basic Counting Principles – Factorial – Binomial Coefficients – Permutations – Combinations – Pigeonhole Principle – Ordered and Unordered Partitions.

**Unit 2:** Order and Inequalities – Mathematical Induction – Division Algorithm – Divisibility – Euclidean Algorithm – Fundamental Theorem of Arithmetic – Congruence Relation – Congruence Equations – Semigroups – Groups – Subgroups – Normal Subgroups – Homomorphisms – Graph Theory: basic definitions-paths, reachability, connectedness matrix representation of graphs, trees.

**Unit 3:** Finite Automata and Regular Expressions: Finite State Systems – Basic definitions – Non-deterministic finite automata – Finite automata with  $\lambda$ -moves – Regular expressions.

**Unit 4:** Properties of Regular sets: Pumping lemma – Closure properties – Decision Algorithms – Myhill–Nerode Theorem – Context Free Grammars – Derivation Trees.

**Unit 5:** Simplifying Context free grammars - Chomsky normal forms – Greibach Normal forms – Pushdown automata and context-free languages.

### **Recommended Texts**

1. J.P. Tremblay and R. Manohar, 1997, Discrete Mathematical Structures with applications to Computer Science, Tata McGraw-Hill, New Delhi.
2. P. Linz, 1997, An Introduction to Formal Languages and Automata, Second Edition, Narosa Pub. House, New Delhi.
3. S. Lipschutz and M. Lipson, 1999, Discrete Mathematics, Second Edition, Tata McGraw-Hill, New Delhi.
4. J.E.Hopcraft and J.D.Ullman, 1993, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi.

### **Reference Books**

1. D.C.Kozen, 1997, Automata and Computability, Springer-Verlag, New York.
2. J. Martin, 2003, Introduction to Languages and the Theory of Computation, 3rd Edition, Tata McGraw-Hill, New Delhi.

## **COURSE OUTCOME**

**CO1:** State the Pigeon -Hole Principle

**CO2:** Illustrate the Process of Push Down Automata

**CO3:** Explain the Pumping lemma for regular search and its applications

**CO4:** Prove the Myhill-Nerode Theorem

**CO5:** Describe Chomsky Normal Form.

**Subject Name: Algorithms Lab**  
**Subject Code: PSD11**

**Year: I**  
**Semester: I**

1. Divide and Conquer :
  - a. Merge Sort
  - b. Quick Sort
  - c. Maximum and Minimum
2. Greedy Method :
  - a. Knapsack Problem
  - b. Tree vertex splitting
  - c. Job Sequencing
3. Dynamic Programming :
  - a. Multistage graphs
  - b. All Pairs Shortest Paths
  - c. String Editing,
  - d. BFS and DFS.
4. Back Tracking :
  - a. 8 Queen Problems
  - b. Hamiltonian Cycles.

### **COURSE OUTCOME**

**CO1:** Develop programs for sorting

**CO2:** Identify all pairs shortest path

**CO3:** Develop efficient method to arrange computer resources

**CO4:** Recognize Hamiltonian cycles

**Subject Name: Advanced Java Programming Lab**  
**Subject Code: PSD12**

**Year: I**  
**Semester: I**

1. HTML to Servlet Applications
2. Applet to Servlet Communication
3. Designing online applications with JSP
4. Creating JSP program using JavaBeans
5. Working with Enterprise JavaBeans
6. Performing Java Database Connectivity.
7. Creating Web services with RMI.
8. Creating and Sending Email with Java
9. Building web applications

### **COURSE OUTCOME**

- CO1:** Design HTML to Servlet Communication.  
**CO2:** Develop Enterprise Java Bean Application.  
**CO3:** Write Sending Mail with Java.  
**CO4:** Design Remote method invocation.  
**CO5:** Develop Online Application with Java.

**Unit 1:** Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media.

**Unit-2:** Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

**Unit 3:** Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

**Unit 4:** Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

**Unit 5:** Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

**Recommended Texts:**

1. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

**Reference Books**

1. B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
2. F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.
3. D. Bertsekas and R. Gallager, 1992, Data Networks, Prentice hall of India, New Delhi.
4. Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

**COURSE OUTCOME**

**CO1:** Discuss Guided Transmission Media

**CO2:** Write on Error Detection and Correction.

**CO3:** Explain Carrier Sense Multiple Access Protocols.

**CO4:** Describe Various Sliding Window Protocols.



**Unit 1:** Introduction – steps in image processing - Image acquisition - representation - sampling and quantization - relationship between pixels. – color models – basics of color image processing.

**Unit-2:** Image enhancement in spatial domain-some Basic gray level transformations-Histogram processing-Enhancement using arithmetic, logic operations-basics of spatial filtering and smoothing.

**Unit 3:** Image enhancement in Frequency domain – Introduction to Fourier transform: 1- D, 2 –D DFT and its inverse transform - smoothing and sharpening filters.

**Unit 4:** Image restoration: Model of degradation and restoration process – noise models – restoration in the presence of noise- periodic noise reduction. - Image segmentation: Thresholding and region based segmentation.

**Unit 5:** Image compression: Fundamentals – models – information theory – error free compression – Lossy compression: predictive and transform coding - JPEG standard.

#### **Recommended Texts:**

1. C. Gonzalez, R.E.Woods, 2009, Digital Image processing, 3rd Edition, Pearson Education.

#### **Reference Books**

1. Pratt.W.K.,Digital Image Processing, 3rd Edition, John Wiley & Sons.
2. Rosenfled A. & Kak, A.C, 1982, Digital Picture Processing, vol .I & II, Academic Press.

### **COURSE OUTCOME**

**CO1:** Discuss the steps in image processing.

**CO2:** Describe Basic gray level transformations.

**CO3:** Understand smoothing and sharpening filters.

**CO4:** Illustrate on noise models.

**Subject Name: Mobile Computing**  
**Subject Code: PSDEA**

**Year: I**  
**Semester: II**

**Unit 1:** Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.

**Unit 2:** Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.

**Unit 3:** Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

**Unit 4:** Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

**Unit 5:** Mobile transport layer - Congestion Control – Implication of TCP Improvement– Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

### **Recommended Text**

1. J. Schiller, 2003, Mobile Communications, 2nd edition, Pearson Education, Delhi.

### **Reference Books**

1. Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India)
2. Pahlavan, Krishnamurthy, 2003(2002), Principle of wireless Networks: A unified Approach, Pearson Education, Delhi.
3. Martyn Mallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., New Delhi.
4. W. Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

### **COURSE OUTCOME**

**CO1:** Elaborate about mobile and wireless devices and comparison done.

**CO2:** Describe the GSM architecture, various protocols and satellite systems.

**CO3:** Illustrate Wireless Lan and Security.

**CO4:** Discuss various layers and routing strategies

**CO5:** Explain about the TCP improvement and snooping.

**Unit 1:** System Development - Object Basics - Development Life Cycle - Methodologies - Patterns - Frameworks - Unified Approach - UML.

**Unit-2:** Use-Case Models - Object Analysis - Object relations - Attributes - Methods – Class and Object responsibilities - Case Studies.

**Unit 3:** Design Processes - Design Axioms - Class Design - Object Storage - Object Interoperability - Case Studies.

**Unit-4:** User Interface Design - View layer Classes - Micro-Level Processes - View Layer Interface - Case Studies.

**Unit-5:** Quality Assurance Tests - Testing Strategies - Object orientation on testing - Test Cases - test Plans - Continuous testing - Debugging Principles - System Usability - Measuring User Satisfaction - Case Studies.

### **Recommended Texts**

1. Ali Bahrami, Reprint 2009, Object Oriented Systems Development, Tata McGraw Hill International Edition.

### **Reference Books**

1. G. Booch, 1999, Object Oriented Analysis and design, 2nd Edition, Addison Wesley, Boston
2. Roger S.Pressman, 2010, Software Engineering A Practitioner's approach, Seventh Edition, Tata McGraw Hill, New Delhi.
3. Rumbaugh, Blaha, Premerlani , Eddy, Lorensen, 2003, Object Oriented Modeling And design , Pearson education, Delhi.

## **COURSE OUTCOME**

**CO1:** Classify various phases of software development life cycle and develop software using object oriented techniques and methodologies with case studies.

**CO2:** Apply object-oriented approach from traditional approach to design and development the system.

**CO3:** Construct various UML models for various development stages of System using the appropriate UML notations.

**CO4:** Analyze and apply design issues to rectify the performance and good system design that is recognized by various object relationships like inheritance, association and dependency.

**Subject Name: RDBMS Lab**  
**Subject Code: PSD21**

**Year : I**  
**Semester : II**

1. Library Information Processing.
2. Students Mark sheet processing.
3. Telephone directory maintenance.
4. Gas booking and delivery system.
5. Electricity Bill Processing.
6. Bank Transactions (SB).
7. Pay roll processing.
8. Inventory
9. Question Database and conducting quiz.
10. Purchase order processing.

### **COURSE OUTCOME**

**CO1:** Implement Common SQL Statement including DDL, DML, and DCL Statements to perform different operations.

**CO2:** Apply embedded and nested queries and views of table for different users.

Basic image manipulation (reading, writing, quantization, sub sampling)

- 1) Basic Intensity transformation
- 2) Histogram Processing
- 3) Filtering in spatial domain-2D FFT and smoothing filters
- 4) Image coding using transformations with SPIHT algorithm
- 5) Color image Enhancement with spatial sharpening.

### **COURSE OUTCOME**

- CO1:** Apply Basic Concepts of Java.  
**CO2:** Write program for Histogram Processing.  
**CO3:** Develop program for Spatial and Smoothing Filters.  
**CO4:** Enhance images with various techniques.

**Subject Name: Principles Of Compiler Design**  
**Subject Code: PSD3A**

**Year: II**  
**Semester: III**

**Unit 1:** Introduction to Compilers - Finite Automata and lexical Analysis.

**Unit-2:** Syntax Analysis: Context free grammars - Derivations and parse trees – Basic parsing techniques - LR parsing.

**Unit 3:** Syntax - directed translation, symbol tables.

**Unit 4:** Code optimization - More about code optimization.

**Unit 5:** Code generation - Error detection and recovery.

**Recommended Texts:**

1. A.V. Aho, J.D.Ullman, 1985, Principles of Compiler Design, Narosa Pub-House.

**Reference Books**

1. D.Gries, 1979, Compiler Construction for Digital Computers, John Wiley & Sons.
2. A.V.Aho, Ravi Sethi, and J.D.Ullman, 1986, Compilers Principles, Techniques and Tools, Addison Wesley Pub. Co.

**COURSE OUTCOME**

**CO1:** Describe Context Free Grammars and its types

**CO2:** Explain Loop Optimization.

**CO3:** Illustrate Code Generation

**CO4:** Construct symbol tables.

**Subject Name: Information Security**  
**Subject Code: PSD3B**

**Year: II**  
**Semester: III**

**Unit 1:** Introduction: Security- Attacks- Computer criminals- Method of defense Program Security: Secure programs- Non-malicious program errors- Viruses and other malicious code- Targeted malicious code- Controls against program threats

**Unit 2:** Operating System Security: Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism- Authentication: Authentication basics- Password- Challenge-response- Biometrics.

**Unit 3:** Database Security: Security requirements- Reliability and integrity- Sensitive data- Interface-Multilevel database- Proposals for multilevel security

**Unit 4:** Security in Networks: Threats in networks- Network security control- Firewalls- Intrusion detection systems- Secure e-mail- Networks and cryptography- Example protocols: PEM- SSL- Ipsec.

**Unit 5:** Adminstrating Security: Security planning- Risk analysis- Organizational security policies-Physical security - Legal- Privacy- and Ethical Issues in Computer Security - Protecting programs and data- Information and law- Rights of employees and employers- Software failures- Computer crime-Privacy- Ethical issues in computer society- Case studies of ethics.

### **Recommended Text**

1. C. P. Pfleeger, and S. L. Pfleeger, Security in Computing, Pearson Education, 4th Ed, 2003
2. Matt Bishop, Computer Security: Art and Science, Pearson Education, 2003.

### **Reference Books**

1. Stallings, Cryptography & N/w Security: Principles and practice, 4th Edition, 2006
2. Kaufman, Perlman, Speciner, Network Security, Prentice Hall, 2nd Edition, 2003
3. Eric Maiwald, Network Security : A Beginner's Guide, TMH, 1999
4. Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
5. Whitman, Mattord, Principles of information security, Thomson, 2nd Edition, 2005

## **COURSE OUTCOME**

**CO1:** Describe Ethical Hacking as a Defense Mechanism.

**CO2:** Understand Security in Operating Systems

**CO3:** Illustrate Threats in Network.

**CO4:** Discuss Proposal on Multilevel Security

**CO5:** Distinguish Legal and Ethical Issues in Computer Security

**Subject Name: Artificial Intelligence**  
**Subject Code: PSD3C**

**Year: II**  
**Semester: III**

**Unit 1:** Introduction - Intelligent Agents- Problem Solving - by Searching - Informed Search and Exploration - Constraint Satisfaction Problems - Adversarial Search

**Unit-2:** Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation

**Unit 3:** Planning – Planning and Acting in the Real World - Uncertain knowledge and reasoning - Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning Over Time - Making Simple Decisions - Making Complex Decisions

**Unit 4:** Learning - Learning from Observations - Knowledge in Learning - Statistical Learning Methods - Reinforcement Learning

**Unit 5:** Communicating, Perceiving, and Acting - Communication - Probabilistic Language Processing - Perception – Robotics.

**Recommended Texts:**

1. Stuart Russell and Peter Norvig, 2003, Artificial Intelligence: A Modern Approach, 2nd Edition, Prentice Hall of India, New Delhi.

**Reference Books**

1. Elaine Rich and Kevin Knight, 1991, Artificial Intelligence, 2nd Edition, Tata McGraw-Hill, New Delhi.
2. Herbert A. Simon, 1998, The Sciences of the Artificial Intelligence, 3rd Edition, MIT Press.
3. N.J. Nilson, 1983, Principles of AI, Springer Verlag.

**COURSE OUTCOME**

- CO1:** Elaborate briefly on Artificial Intelligence and its techniques.  
**CO2:** Discuss on Knowledge representation and Logical Agents.  
**CO3:** Describe about Planning, Probabilistic Reasoning and Making Simple and Complex Decision.  
**CO4:** Understand Learning from Observations, Statistical and Reinforcement Learning.  
**CO5:** Describe the Communication, Language processing, Perception of Robotics.



**Subject Name: Big Data Analytics**  
**Subject Code: PSDED**

**Year: II**  
**Semester: III**

**Unit 1:** Basic nomenclature - Analytics process model - Analytics model requirements - Types of data sources – Sampling - types of data elements - Visual Data Exploration and Exploratory Statistical Analysis - Missing Values - Outlier Detection and Treatment - Standardizing Data – Categorization - weights of evidence coding - Variable selection - Segmentation.

**Unit 2:** Predictive Analytics: Target Definition - Linear Regression - Logistic Regression - Decision Trees - Neural Networks - Support Vector machines - Ensemble Methods - Multiclass Classification Techniques - Evaluating Predictive Models.

**Unit 3:** Descriptive Analytics: Association Rules - Sequence Rules - Segmentation. Survival Analysis: Survival Analysis Measurements - Parametric Survival Analysis.

**Unit 4:** Social Network Analytics: Social Network Definitions - Social Network Metrics - Social Network Learning -Relational Neighbor Classifier - Probabilistic Relational Neighbor Classifier - Relational logistic Regression - Collective Inference.

**Unit 5:** Benchmarking - Data Quality - Software – Privacy - Model Design and Documentation - Corporate Governance. Example applications: Credit Risk Modeling - Fraud Detection - Recommender Systems - Web Analytics.

**Recommended Text:**

1. Baesens, 2014, Analytics in a Big Data World: The Essential Guide to Data Science and Its applications, Wiley India Private Limited

**Reference Books**

1. Michael Minelli, Michele Chambers, 2013, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO
2. Stephan Kudyba, 2014, Big Data, Mining and Analytics: Components of Strategic Decision Making, CRC Press.
3. Frank J. Ohlhorst, 2013, Big data Analytics: Turning Big Data into Big Money, Wiley and SAS Business Series.
4. Foster Provost, Tom Fawcett, 2013, Data Science for Business, SPD.

**COURSE OUTCOME**

- CO1:** Understand the basic concepts of data and analysis.  
**CO2:** Apply predictive analytic techniques for doing predictions  
**CO3:** Discuss various descriptive Analytics techniques.  
**CO4:** Analyse social networks using social networks.  
**CO5:** Understand various Big Data Applications.

**Subject Name: Cloud Computing**  
**Subject Code: PSDEJ**

**Year: II**  
**Semester: III**

**Unit 1:** Understanding Cloud Computing: Cloud Computing –History of Cloud Computing – Cloud Architecture –Cloud Storage –Why Cloud Computing Matters –Advantages of Cloud Computing – Disadvantages of Cloud Computing –Companies in the Cloud Today –Cloud Services.

**Unit 2:** Developing Cloud Services: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud Service Development –Software as a Service – Platform as a Service-Infrastructure as a service –Web Services –On-Demand Computing – Discovering Cloud Services Development Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds.

**Unit 3:** Cloud Computing For Everyone: Centralizing Email Communications – Collaborating on Schedules –Collaborating on To-Do Lists –Collaborating Contact Lists – Cloud Computing for the Community –Collaborating on Group Projects and Events –Cloud Computing for the Corporation.

**Unit 4:** Using Cloud Services: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications –Exploring Online Planning and Task Management – Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing -Collaborating on Databases –Storing and Sharing Files.

**Unit 5:** Other Ways To Collaborate Online: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools –Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.

### **Recommended Text**

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Kumar Saurabh, “Cloud Computing –Insights into New Era Infrastructure”, Wiley Indian Edition, 2011.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008

### **COURSE OUTCOME**

**CO1:** Discuss Cloud Architecture with diagram.

**CO2:** Explain Cloud Service Development.

**CO3:** Write about Cloud computing for the community.

**CO4:** Elaborate on Exploring online planning and task management.

**CO5:** Evaluate Web Mail Services.

**Subject Name: Mini Project**  
**Subject Code: PSD31**

**Year: II**  
**Semester: III**

Each student will develop and implement individually application software based on any emerging latest technologies.

### **COURSE OUTCOME**

**CO1:** Understand Software Development process.

**CO2:** Design and Develop real time in-house applications

**Subject Name: Project & Viva-Voce**  
**Subject Code: PSD41**

**Year: II**  
**Semester: IV**

The project work is to be carried out either in a software industry or in an academic institution for the entire semester and the report of work done is to be submitted to the University.

### **COURSE OUTCOME**

**CO1:** Understand the Design and Develop an application in industry.

**CO2:** Analyze the Software Product through Life Cycle Models.