BRANCH-INFORMATION TECHNOLOGY

Specialization: IT

Second Semester							
	Theory				Practical		
Course Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation	Hours/ Week L/T	Credit Practical	Marks
Specialization Core-1 Data Ware Housing & Data Mining	4-0	4	100	50	-	-	-
Specialization Core-2 Software Engineering	4-0	4	100	50	-	-	-
Elective I(Specialization related) 1. Distributed Database System. 2. J2EE. 3. Information Extraction and Retrieval. 4. Enterprise Resource Planning (IT)	4-0	4	100	50	-	-	-
Elective II(Departmental related) 1. Information Theory and Coding Techniques 2. Cloud Computing 3. Cryptography 4. Graph Theory.	4-0	4	100	50	-	-	-
Elective III(from any department) 1. Mobile Computing. 2. Business Function Process. 3. Big Data Analytic 4. Bio Informatics. 5. Digital Image Processing	4-0	4	100	50	-	-	-
Lab-2 (Specialization lab to be decided by the department)					4	4	150
Seminar/Project					4	4	150
Total							
Total Marks: 1050							
Total Credits: 28							

Data Ware Housing & Data Mining
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Introduction to Data Mining, Paradigm, Computing Paradigm, Business Paradigm, Business Problem Definition, Operational & informational Data stores, Data Warehouse Definition & characteristics, Data Warehouse Architecture, Client /Server Computing Model & Data Warehouse, Overviews of Client/server Architecture, Server specialization in client/server computing Environment, Server Function, Server H/W Architecture RISC verses CISC, Multiprocessor System, SMP implementation, Parallel Processors and Cluster Systems,

MODULE-II
Distributed Memory Architecture, Cluster System, Advances in Multiprocessing Architecture, Server Operating System, Operating System Implementation
Data Warehousing Component, Overall Architecture, Data Warehouse Database Sourcing, Acquisition, Cleanup &transformation Tools, Metadata, Access Tools, Data Marts, Data Warehouse Administration and Management, Information Delivery System, Business & Data Warehouse,

MODULE-III
Business Consideration :Return& Investment, Design Consideration, Implementation Consideration, Benefits of Data Warehousing, Mapping the Data Warehouse to Multi Processor Architecture, Database architecture for Parallel Processing, Shared Memory Architecture, Shared Disk Architecture, Shared Nothing Architecture, Combined Architecture

MODULE-IV
Introduction to Data Mining, Measuring Data Mining effectiveness: Accuracy , speed & Cost, Embedding Data Mining into your Business Process, Discovery verses Prediction, Comparing the Technology, Business Score Card, Application Score Card, Algorithm Score card, Decision Tree, CART, CHAID, Growing the Tree, When does the Tree stop growing, Strength & Weakness, Algorithm Score Card, Neural Network, Different types of neural N/W, Kohonen feature maps, Nearest Neighbor and Clustering, Business Score Card Where to use clustering & nearest neighbor prediction, Clustering for clarity, Clustering for out layer analysis, Nearest Neighbor for prediction, Application Score Card

Text Books :
Data Warehousing, Data Mining & OLAP by Alex & Stephen, McGraw Hill.

Software Engineering & Development Methodologies
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Evaluation of Software Design Technique: Adhoc Base, Control Base, Data Structure, Data Flow, Objective Oriented. Process Model: SDLC, Component Base Software Developer Model, Unified Model, Fountain Model, 4P Approach: People, Process, Project, Product. Software Metrics: Process Metrics: LOC, COCOMO, PF, OO Process Metric, Use Case Process Metric.

MODULE-II
Product Metrics: FP, Architectural Design Metrics, Metrics for OO Design, Class Oriented Metric, Coupling Metric, Cohesion Metric. Metrics for Testing. Project Metrics: Web Engg. Object Technology: Object, Classes, Message, Class Hierarchy, Inheritance, Abstract, Encapsulation, Polymorphisms. Relationship: IsA, Has A, UsesA. Object Oriented Modeling:

MODULE-III
Booch Notation, Rumbaugh Object Modeling Technique, Jacabson Model: Use Case, Abstract Use Case, Actor, Abstract actor. Use case Model: Domain Object Model, Analysis Object Model, Design Model, Testing Model, Implementation Model
UML Diagram: Class Diagram, Object Diagram, Sequence Diagram, Collaboration Diagram, Activity Diagram, State Chart Diagram, Component Diagram, Deployment Diagram

MODULE-IV
Object Oriented Analysis: Class: Interface Class, Control Class, Entity Class.Developing Use Case: Use case Element, Description, Case Study (i.e ATM), Class Classification Approach, Noun Phase Approach, Classical Approach, Function Point Approach, Structural Approach, CRC Card.
Object Oriented Design: Component Level Design, Cohesive, Coupling
Object Oriented Testing: System Testing: Requirement Specification, Integration Testing: Sequence Testing, Inheritance Testing, Polymorphism Testing, Encapsulation Testing
Unit Testing: Class Testing, Method Testing

Text Book:
Software Engineering by Pressman McGraw Hill

Distributed Database System.
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Features of distributed databases, features of centralized databases, level of distributed transparency – Reference Architecture, types of Data Fragmentation, distribution Transparency, Access primitives, Integrity constraints.

MODULE-II
Distributed Database design – A frame work, the design of database fragmentation, the allocation of fragments.Translation of global queries into fragment queries, query optimization.
Distributed Transaction Management – A framework, transaction atomicity, 2-phase commit, concurrency control: fundations, distributed deadlocks, timestamps.

MODULE-III
Reliability: Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.
Commercial Systems: Tranclem's ENCOMPASS

MODULE-IV
Distributed database systems, IBM's Inter system communication, feature of distributed ingres and Oracle.
Heterogeneous databases: General problems – brief study of multibase.

Text Book:
Ceri S. Pelagatti. G, Distributed Database systems Principles and Systems, McGraw Hill.

J2EE.
Theory L/T (Hours per week): 4/0, Credit: 4

Module-I:
Enterprise Java Programming: Overview, Java EE 6 API, Web Applications, Java Servlet Technology: - Lifecycle of a Servelet, Servelet API, Servlet Packages, Types of servlets, Database Access, Stateless and Stateful protocols, Session Tracking. JSP Technology: - Architecture & Anatomy of JSP Page, JSP life cycle, JSP with MVC Architecture, Dynamic webpage Creation, Scripting Elements, Session Tracking, Database access, JSTL, JavaServer Faces (JSF) Technology, Facelets, Ajax.

Module-II:
Web Services: JAX P: SAX,DOM,, JAX B:XJC, Marshaling , Unmarshaling , WSDL, JAX-WS: Apache axis 2 implementation   contract first,   contract last ,Building consumer , RPC encoded , RPC literal , Document /Encoded , Document /Literal, Document/Wrapped , SOAP. JAX-RS

Module-III:
Advanced Technologies – Frameworks:
Struts:Introduction,Features   and   Architecture,The   MVC   Design   Pattern, **Hibernate:**Introduction to O-R Mapping,Hibernate Basics, Hibernate Architecture,Hibernate Configurations, POJO (Plain Old Java Classes) classes and O/R Mapping, Hibernate Query Language.

Module-IV:
Spring :IOC, dependency Injection , Constructor injection, setter injection ,type, index ,name attributes , Collection injection , Bean inheritance, IDRef, Bean aliasing , Bean scopes , Automating,
Nested bean factories, dependency Check, dependency On, Aware interface, static factory method, Instance factory method, Factory Bean, Method replacement , look up method injection , Properties editors , Internationalizations(I18 N), Bean POST Processor , Bean factory POST Processor , Event Factory vs Application Context , Spring AOP, Spring Integration with Hibernate, Spring integration with Struts,Introduction to design pattern.

Books:
Eric Jendrock, D. Carson, I. Evans, D. Gollapudi, K. Haase, C. Srivastha, "The Java EE6 Tutorial", Volume-1, Fourth Edition, 2010, Pearson India, New Delhi. Chapters: 1, 3, 4, 5, 7, 9 to 12, 14 to 16, 17, 19, 23, 26, 27, 28.
Ralph Moseley, "Developing Web Applications", 2008, Wiley India, New Delhi.
Kongent S., "Java Server Programming (JEE 6) Black Book, Platinum Edition", 2008, Dreamtech / Wiley India Pvt. Ltd.
David Geary, Cay S. Horstmann, "Core JavaServer Faces", Second Edition, 2007, Pearson Education, Inc. New Delhi.
Java 7 JAX-WS Web Services by Deepak Vohra
Building a Restful Web Service with Spring by LudovicDewaillySpring in Action by Craig Walls
Hibernate in Action by Christian Bauer Gavin King

Information Extraction and Retrieval.
Theory L/T (Hours per week): 4/0, Credit: 4

Module-I:
Introduction to Information Retrieval
The nature of unstructured and semi-structured text.Inverted index and Boolean queries.
Text Indexing, Storage and Compression
Text encoding: tokenization, stemming, stop words, phrases, index optimization. Index compression: lexicon compression and postings lists compression. Gap encoding, gamma codes, Zipf'sLaw.Index construction. Postings size estimation, merge sort, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

Module-II:
Retrieval Models
Boolean, vector space, TFIDF, Okapi, probabilistic, language modeling, latent semantic indexing.Vector space scoring.The cosine measure.Efficiencyconsiderations.Document length normalization.Relevance feedback and query expansion.Rocchio.
Performance Evaluation
Evaluating search engines.User happiness, precision, recall, F-measure. Creating test collections: kappa measure, interjudge agreement.

Module-III:
Text Categorization and Filtering
Introduction to text classification.Naive Bayes models. Spam filtering. Vector space classification using hyperplanes; centroids; k Nearest Neighbors. Support vector machine classifiers. Kernel functions. Boosting.
Text Clustering
Clustering versus classification.Partitioningmethods.k-means clustering. Mixture of gaussiansmodel.Hierarchical agglomerative clustering.Clustering terms using documents.

Module-IV:
Advanced Topics:Summarization, Topic detection and tracking, Personalization, Question answering, Cross language informtion retrieval
Web Information Retrieval: Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS.
Retrieving Structured Documents:XML retrieval, semantic web

Textbooks:
Introduction to Information Retrieval Manning, RaghavanandSchutze, Cambridge University Press, draft.
Modern Information Retrieval Baeza-Yates and Ribeiro-Neto, Addison Wesley, 1999.
A comprehensive survey by Ed GreengrassMining the Web, SoumenCharabarti, Morgan-Kaufmann, 2002.

Enterprise Resource Planning(IT)
Theory L/T (Hours per week): 4/0, Credit: 4

Module-I:
INTRODUCTION
ERP Concepts – Enterprise System – Evolution of ERP – Tangible and Intangible Benefits – Emerging Trends in ERP adoption – ERP Implementation Stages – case Study.
PRE – IMPLEMENTATION STAGE
Need Analysis – Competitive Environment Analysis – Gap Analysis – Cost Elements – Feasibility Analysis – ERP Modules – ERP Industries verticals – ERP Architecture –ERP Software – SAP - Baan – IFS – Oracle – people Soft Comparison of ERP Software – ERP Package Evaluation Criteria – Package Life Cycle – Request for Information – Functional Requirement Specification – Request for Proposal – Vendor Selection – ERP Consultants – Case Studies.

Module-II:
IMPLEMENTATION
Business Process Reengineering Concepts – Reengineering and Process Improvement – BPR Steps – AS-IS and TO – BE Analysis – Modeling Business Process – Successful BPR – Reengineering – Organizational Readiness – Implementation Approaches.

Module-III:
PROJECT MANAGEMENT
Project Management – Project Team – Steering Committee – Project Manager – Functional Team – IS Team – Security Specialists. Project Deliverables – Change Management – System integration – Systems Integration standards – Middleware Development – Forward and Reverse Engineering – ERP Infrastructure Planning – System Architecture

Module-IV:
POST IMPLEMENTATION
Organizational Transformational Model of ES Success – Cross Functional, Organizational and Industrial Impacts.Measuring Business Benefits – Balanced Score card Method – ABCD Checklist Framework – Capability Maturity Framework – case study.

References:
1. MahadeoJaiswal and Ganesh Vanapalli, Text Book of Enterprise Resource Planning,
Macmillan India Ltd., Chennai 2005.
2. Alexis Leon, Enterprise Resource Planning Demystified, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2004.
3. Vinod Kumar Grag and N.K. Venkitakrishnan, Enterprise Resource Planning – Concepts and Practice, Prentice Hall of India, New Delhi, 1998.

Information Theory and Coding Techniques
Theory L/T (Hours per week): 4/0, Credit: 4

Module-I:
Introduction to information Theory, Information and entropy, properties of entropy of a binary memory less source, Measure of Information,

Module-II:
Source Coding, Shannon-Fano coding, Huffman coding, Lempel ZIV coding, channel coding, Channel capacity, noisy channel coding theorem for DMC.

Module-III:
Linear block codes, generator matrices, parity check matrices, encoder syndrome and error detection-minimum distance, error correction and error detection capabilities, cyclic codes, coding and decoding.

Module-IV:
Coding convolutional codes, encoder, generator matrix, transform domain representation state diagram, distance properties, maximum likelihood decoding, Viterbi decoding, sequential decoding, interleaved convolutional codes.

Text Books:
1. Elements of Information Theory ,T.M.Cover, J.A.Thomas, Wiley
2. R.McEliece, The Theory of Information and Coding, Addison-Wesley.

CLOUD COMPUTING

MODULE – I:

Cloud Computing Basics- Overview, Applications, Intranets and the Cloud. Organization and Cloud Computing- Benefits, Limitations, Security Concerns.

Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

Software as a Service (Saas)- Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA.

Platform as a Service (PaaS)- IT Evolution Leading to the Cloud, Benefits of Paas Solutions, Disadvantages of Paas Solutions.

Infrastructure as a Service (Iaas)-Understanding IaaS, Improving Performance through Load Balancing, System and Storage Redundancy, Utilizing Cloud-Based NAS Devices, Advantages, Server Types.

MODULE-II:

VIRTUALIZATION: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization

Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices -

Virtual Clusters and Resource management – Virtualization for Data-center Automation.

Design of Compute and Storage Clouds – Layered Cloud Architecture Development

– Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform

Deployment – Global Exchange of Cloud Resources.

MODULE-III

SECURITY IN THE CLOUD

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security –

Security Governance – Risk Management – Security Monitoring – Security Architecture Design –

Data Security – Application Security – Virtual Machine Security - Identity Management and Access

Control – Autonomic Security.

MODULE-IV

DESIGNING CLOUD BASED SOLUTIONS-System Requirements, Design Is a Give-and-Take Process. Coding Cloud Based Applications-Creating a Simple Yahoo Pipe, Using Google App Engine and creating a Windows Azure Application. Application Scalability-Load-Balancing Process, Designing for Scalability, Capacity Planning Versus Scalability, Scalability and Diminishing Returns and Performance Tuning.

Text Books:

1. Cloud Computing : A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by The McGraw-Hill.
2. Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more. by Dr. Kris Jamsa.

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.

3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

4. Kumar Saurabh, " Cloud Computing – insights into New-Era Infrastructure", Wiley India,2011.

5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in

the Cloud" O'Reilly

6. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.

7. Katarina Stanoevska-Slabeva, Thomas Wozniak, Santi Ristol, "Grid and Cloud Computing – A

Business Perspective on Technology and Applications", Springer.

8. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.

9. Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, 'Mastering Cloud Computing", TMGH,2013.

10. Gautam Shroff, Enterprise Cloud Computing, Cambridge University Press, 2011

11. Michael Miller, Cloud Computing, Que Publishing,2008

12. Nick Antonopoulos, Cloud computing, Springer Publications, 2010

13.Cloud Computing Bible by Barrie Sosinsky, Published by Wiley Publishing, 2011.

14. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, and Dr. Fern Halper, Wiley Publishing, 2010.

15. Moving to The Cloud, Dinakar Sitaram, Elsevier, 2014. 4. Cloud Computing Theory And Practice Danc.Marinercus, Elsevier, 2013.

Cryptography
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Introduction to Cryptography: Basics of Symmetric Key Cryptography, Basics of Assymetric Key Cryptography, Hardness of Functions
Notions of Semantic Security (SS) and Message Indistinguishability (MI): Proof of Equivalence of SS and MI, Hard Core Predicate, Trap-door permutation, Goldwasser-Micali Encryption.

MODULE-II
Goldreich-Levin Theorem: Relation between Hardcore Predicates and Trap-door permutations
Formal Notions of Attacks: Attacks under Message Indistinguishability: Chosen Plaintext Attack(IND-CPA), Chosen Ciphertext Attacks (IND-CCA1 and INDCCA2), Attacks under Message Non-malleability: NM-CPA and NM-CCA2, Interrelations among the attack model
Random Oracles: Provable Security and asymmetric cryptography, hash functions
One-way functions: Weak and Strong one way functions

MODULE-III
Pseudo-random Generators (PRG): Blum-Micali-Yao Construction, Construction of more powerful PRG, Relation between One-way functions and PRG, Pseudorandom Functions (PRF)
Building a Pseudorandom Permutation: The LubyRackoff Construction: Formal Definition, Application of the LubyRackoff Construction to the construction of Block Ciphers, The DES in the light of LubyRackoff Construction
Left or Right Security (LOR)

MODULE-IV
Message Authentication Codes (MACs): Formal Definition of Weak and Strong MACs, Using a PRF as a MAC, Variable length MAC
Public Key Signature Schemes: Formal Definitions, Signing and Verification, Formal Proofs of Security of Full Domain Hashing
Assumptions for Public Key Signature Schemes: One way functions Imply Secure One-time Signatures Shamir's Secret Sharing Scheme Formally Analyzing Cryptographic Protocols
Zero Knowledge Proofs and Protocols

REFERENCE BOOKS:

1. Y. Daniel Liang: Introduction to JAVA Programming, 6th Edition, Pearson, 2007.

2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2006.
3. XueBai et al: The Web Warrior Guide to Web Programming, Thomson, 2003.
4. HansDelfs and Helmut Knebl, Introduction to Cryptography: Principles and Applications, Springer Verlag.

Graph Theory
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Basic Concepts: Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group; Trees: Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem, minimum spanning trees; Connectivity: Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger s theorem; Paths and Cycles: Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, girth, circumference, the Chinese Postman Problem, the Travelling Salesman problem, diameter and maximum degree, shortest paths;

MODULE-II
Matchings: Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f-factor theorem;

MODULE-III
Extremal problems: Independent sets and covering numbers, Turan's theorem, Ramsey theorems; Colorings: Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem; Graphs on surfaces: Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces; Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, branchings;

MODULE-IV
Networks and flows: Flow cuts, Max flow min cut theorems, perfect square; Selected topics: Dominating sets, the reconstruction problem, intersection graphs, perfect graphs, random graphs.

Text Books:
1. T. H. Cormen, C. E. Leiserson and R. L. Rivest, Introduction to Algorithms, Prentice Hall of India, 3rd ed, 2006.
2. N. Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2004.

Reference Books:
1. D. B. West, Introduction to Graph Theory, 2nd Ed, Prentice Hall of India, 2007.
2. R. Diestel, Advanced Graph Theory, Springer Verlag Heidelberg, New York, 2005.
3. M. T. Goodrich and R. Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Wiley, 1st ed, 2001.

Mobile Computing.
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Overview of wireless technologies. Wireless multiple access protocols. Cellular systems: Channel allocation. Location management.

MODULE-II
Wireless LANs: Medium access, Mobile IP routing. TCP over wireless.Mobile ad hoc networking.

MODULE-III
Energy efficiency.Impact of mobility on algorithms and applications.

MODULE-IV
Disconnected operation of mobile hosts.Databroadcasting.Mobile agents.

References:
1. J. H. Schiller. Mobile Communications. Addison Wesley, 2000.
2. A. Mehrotra. GSM System Engineering.Artech House, 1997.
3. Charles Perkins. Mobile IP. Addison Wesley, 1999.
4. Charles Perkins (ed.) Adhoc Networks. Addison Wesley, 2000 Relevant RFCs, internet drafts and research papers.

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Business Function Process
Theory L/T (Hours per week): 4/0, Credit: 4

Module-I:
Language of Business: Introduction to business process; Cyclical nature of business; Forms of business organizations; Functions and Objectives of Accounting; Users of Accounting information; Accounting Equation; Effect of Financial transactions on accounting equations; Accounting Methods; Accounting principles; Contents of Balance Sheet and Income Statement; Presentation of Balance Sheet and Income statement; Inter-relationship between Balance Sheet and Income Statement.

Module-II:
Cost Functions: Cost concepts; cost sheet-preparation and presentation; CVP analysis. Accounting Cycle: Introduction to Accounting cycles; Revenue and expenses recognition; Recording of business transactions; Journal, Cash Book, Ledger and Trial Balance, measuring business income, Preparation of Financial statements, Profit and Loss account and Balance Sheet. Cash flow analysis, developing a program to draw up Income statement and Balance sheet.

Module-III:
Inventory Management: Aggregate Planning, Inventory Control fundamentals, Material Requirements Planning, Procurement Process,

Module-IV:
Sales and Logistics:Forecasting, Sales Process, Sales Practices, Pricing Practices, Logistics and Distribution

Reference Books:
1. Ashish Bhattacharya, Financial Accounting, PHI
2. R. Narayanswamy, Financial Accounting, PHI
3. Adam and Elbert, Production Operations Management

Big Data Analytics Syllabus

MODULE I

Introduction – small and big data, Big data: definition and taxonomy and its importance, Big data applications, Drivers for Big Data, Big data analysis – clustering, classifying, recommending and modeling, data reduction, normalizing and adjusting data,
Introduction to Big Data Analytics – Big Data Analytics applications.

MODULE II

Big Data Analytics: Run descriptive to understand the nature of the available data, collate all the data sources to suffice business requirement, Run descriptive statistics for all the variables and observer the data ranges, Outlier detection and elimination.

MODULE III

Introduction to Big Data tools like Hadoop,Data analytics using MapReduce/Hadoop, Data visualization techniques,
Hadoop's Parallel World – Data discovery – Open source technology for Big
Data Analytics – cloud and Big Data –Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics – Information Management.

MODULE IV

Big Data & Machine Learning, Selected machine learning and data mining methods (such as support vector machine and logistic regression), Statistical analysis techniques (such as conjoint analysis and correlation analysis), Time series analysis D. Big data graph analytics.

REFERENCES:

1. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging
Business Intelligence and Analytic Trends for Today's Business", 1st Edition,
Ambiga Dhiraj, Wiely CIO Series, 2013.

2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the
Game", 1st Edition, IBM Corporation, 2012.

Bio Informatics
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Sequence-alignment methodologies: Sequence databases; Similarity matrices; Pairwise alignment: Features of dynamic Programming, alignment by Bayesian Statistical Methods, multiple sequence alignment: local multiple sequence alignment: MEME, PSSM, HMM(algorithms and applications) Progressive methods for global multiple sequence alignment: CLUSTALW, PILEUP, T-COFFEE; Statistical significance of alignment results;

MODULE-II
Pattern analysis in sequences and Phylogenetic tree construction methods: Motif representation, Markov models; .Distance Based methods: clustering based methods,optimality based methods: Fitsch -Margoliash and Minimum evolution methods, Neighbor joining and related neighbor methods Character Based methods: Maximum parsimony methods, Maximum likely hood method, genetic algorithm, Phylogenetic tree evaluation: Boot strap analysis; dendrogram and applications .

MODULE-III
Structure-Prediction of Biomolecules with applications in Bioinformatics: Structure classification of proteins (SCOP, CATH); Secondary structure prediction of various protein categories (e.gtransmembrane proteins and helical proteins), RNA secondary structure prediction methods.

MODULE-IV
Patterns, motifs and Profiles in sequences: Derivation and search methods; Derived Databases of patterns, motifs and profiles e.gProsite, Blocks, Prints-S, Pfam; Overview of tertiary structure prediction methods; algorithms for modeling protein folding; algorithms for 3D structure prediction with representative examples Protein structure prediction by comparative modelling approaches (homology modeling and fold recognition); ab initio structureprediction methods.

Digital Image Processing
Theory L/T (Hours per week): 4/0, Credit: 4

MODULE-I
Digital Image Fundamentals, Image Transforms: Fourier, Hadamard, Walsh, Discrete cosine and Hotelling Transforms; Image Enhancement: Histogram modification, Histogram equalisation, Smoothing, Filtering, Sharpening, Homomorphic filtering. ;

MODULE-II
Image restoration, Segmentation: Pixel classification, Bi-level thresholding, Multi-level thresholding, P-tile method, Adaptive thresholding, Spectral & spatial classification, Edge detection, Hough transform, Region growing.

MODULE-III
Matching and Registration: Image modeling, Stereo mapping, Landmark matching, Rectification in geometric transformations, Match measurement, Matching of binary pattern, Distortion tolerant matching; Digital geometry and its applications: Neighborhood, Path, Connectedness, Holes and Surroundness, Borders, Distances, Medial Axis Transform (MAT), Shrinking and Expanding, Thinning.

MODULE-IV
Introduction to Mathematical morphology and its application, Morphological Operations, Dilation, Erosion, Opening, Closing, Smoothing, Extraction of connected components, Thinning.

TEXT BOOKS:
1. R.C. Gonzalez, R.E. Woods, Digital Image Processing, Pearson Prentice Hall, 2007.
2. B. Chanda, D.D. Majumder, Digital Image Processing and Analysis, Prentice Hall, 2007.

REFENCE BOOKS:
1. W.K. Pratt, Digital Image Processing (Fourth Edition), John Wiley & Sons, Inc., 2007
2. A.K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1988.