

Sandip University

Neelam Vidya Vihar, Vill.: Sijoul. P.O. : Mailam, Dist.:Madhubani, Bihar -847235

Website : <http://www.sandipuniversity.edu.in>

Toll-Free No.- 1800-313-2714 Ph: 7549991044.

| | | | |
|---|--|--|--|
| School: Engineering & Technology | | Programme: B.Tech (Computer Science & Engg.) | |
| Year: Fourth Year | | Semester -VII | |
| Course: Principle of Programming Language | | Course Code: CS701T | |
| Theory: 3 Hours/Week | | Max. University Theory Examination: 60 Marks | |
| Tutorial: 1 Hour/Week | | Continuous Internal Assessment: 40 Marks | |
| Max. Time for Theory Exam.: 2.5 Hrs | | Credit: 4 | |
| Objectives : | | | |
| 1 | Student will able to learn about various programming language and its characteristics. | | |
| 2 | To learn about techniques used in the programming language and its syntax. | | |
| 3 | To learn about various object handling process and the basic technique. | | |
| 4 | To know about language processing in the field of programming. | | |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | History and Need of Various types of Programming Languages(PL), Types of PL, Characteristics of PL, Syntax, Semantics, Pragmatics Analysis Procedure based languages: General features, Data types, Abstract Data Types (ADT), Structuring, Syntax, Semantics, RAM model of computation, Example: C language | 12 |
| 2 | Object based languages: Concepts of objects, Class vs ADT, control structures, methods, General features-inheritance, polymorphism, derived classes & information hiding, Example: C++ and Java, Difference with C | 8 |
| 3 | Concurrent programming languages: Concurrency structure for message passing, loosely coupled system, shared memory, PRAM, monitor, semaphore, Example: Java RMI, Parallel Java, Parallel C. | 8 |
| 4 | Predicate calculus- Logical operators, Propositional forms, Rules of inference, Logical equivalence, Quantification, Well formed formula, Dis-proofs; Prolog- Syntax, Lists, Operators and arithmetic, Control, i/o, data structures. | 10 |
| 5 | Lambda calculus- Lambda expressions, Variables, Substitutions, Arithmetic, Conditionals, Recursion, Lambda reduction, Type assignment, Polymorphism, Lambda calculus and computability; Lisp- Control constructs, List processing, Files and i/o, Generic functions, Objects, Exceptions | 10 |

| | | |
|--|------------|----|
| | Total Hrs. | 48 |
|--|------------|----|

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Define the various objective related to programming language and its basics. |
| CO2 | Utilize the various resources and the techniques to develop the software. |
| CO3 | Describe the syntax and semantics of various programming language. |
| CO4 | Define the calculus and expressions of various languages. |

| Resources | |
|-------------------|--|
| Recommended Books | 1. Programming Languages: Concepts and Constructs by Ravi Sethi, Pearson Education.. |
| Reference Books | 1. Programming Language Concepts by Carlo Ghezzi and Mehdi Jazayeri, John Wiley & Sons.. |
| E-Resources | http://nptel.ac.in/ |

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| | |
|---------------------------------------|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Management & Entrepreneurship | Course Code: CS702T |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|---|
| 1 | To learn about management and entrepreneurship in a very basic manner. |
| 2 | To learn about leadership and motivation theories and the organization technique. |
| 3 | To learn about meaning of project and characteristics and its identification. |
| 4 | To learn about micro and small enterprises and its characteristics. |

| Unit Number | Details | Hours |
|-------------|--|-------|
| 1 | Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories,. Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection | 10 |
| 2 | Meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control. | 10 |
| 3 | Meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study. | 10 |
| 4 | Meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – | 10 |

| | | |
|-------------|--|----|
| | Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation. | |
| 5 | Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study (Captain G R Gopinath), case study (N R Narayana Murthy & Infosys), Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency | 10 |
| Total (Hrs) | | 50 |

Course Outcome

Student Should able to :

| | |
|-----|--|
| CO1 | Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship. |
| CO2 | Utilize the resources available effectively through ERP. |
| CO3 | Make use of IPRs and institutional support in entrepreneurship |

Resources

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|-------------------|---|
| Recommended Books | Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6 th Edition, 2010. |
| Reference Books | 1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier. 2. Entrepreneurship Development -S S Khanka -S Chand & Co. |
| E-Resources | http://nptel.ac.in/ |

Tutorials:

Tutorial assessment shall be conducted for the Project, Tutorials, Industrial Visit report and Seminar. Tutorial is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the school. At the end of the semester, the final grade for a Tutorial shall be assigned based on the performance of the student and is to be submitted to the University.

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|-------------------------------------|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Machine Learning | Course Code: CS703T |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

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|---|--|
| 1 | To understand the concept of learning problem. |
| 2 | To understand the decision making problem. |
| 3 | To understand the artificial neural problem. |
| 4 | To know the basics of Bayesian learning and instance based learning. |

| Unit Number | Details | Hours |
|-------------|--|-------|
| 1 | Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias. | 10 |
| 2 | Decision Tree Learning: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis-space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. | 10 |
| 3 | Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Backpropagation algorithm. | 10 |
| 4 | Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm | 8 |
| 5 | Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. Instance Based Learning: Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Reinforcement Learning: Introduction, Learning Task, Q Learning | 12 |
| Total (Hrs) | | 50 |

| Course Outcome | |
|--|---|
| Later effective conclusion of course, a Student Should able to : | |
| CO1 | Recall the problems for machine learning. And select the either supervised, unsupervised or reinforcement learning. |
| CO2 | Understand theory of probability and statistics related to machine learning |
| CO3 | Illustrate concept learning, ANN, Bayes classifier, k nearest neighbor, Q, |

| Resources | |
|-------------------|--|
| Recommended Books | 1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education. |
| Reference Books | 1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics. 2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press. |
| E-Resources | http://nptel.ac.in/ |

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|--|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Cloud Computing (Elective – I) | Course Code: CS704TE(I) |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

| | |
|---|---|
| 1 | Introduce the cloud computing in a very basic way. |
| 2 | To learn about cloud computing and its advantage in the industry. |
| 3 | To learn about cloud computing architecture and the virtualization. |
| 4 | To learn about cloud platform in industry and its utilization. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Introduction ,Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjrasoft Aneka Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology | 8 |
| 2 | Cloud Computing Architecture, Introduction, Cloud Reference Model, Architecture,Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service,Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition, Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy Organizational Aspects Aneka: Cloud Application Platform, Framework Overview, Anatomy of the Aneka Container, From the | 8 |

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|-------------|--|----|
| | Ground Up: Platform Abstraction Layer, Fabric Services, foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools | |
| 3 | Concurrent Computing: Thread Programming, Introducing Parallelism for Single Machine Computation, Programming Applications with Threads, What is a Thread? Thread APIs, Techniques for Parallel Computation with Threads, Multithreading with Aneka, Introducing the Thread Programming Model, Aneka Thread vs. Common Threads, Programming Applications with Aneka Threads, Aneka Threads Application Model, Domain Decomposition: Matrix Multiplication, Functional Decomposition: Sine, Cosine, and Tangent. High-Throughput Computing: Task Programming, Task Computing, Characterizing a Task, Computing Categories, Frameworks for Task Computing, Task-based Application Models, Embarrassingly Parallel Applications, Parameter Sweep Applications, MPI Applications, Workflow Applications with Task Dependencies, Aneka Task-Based Programming, Task Programming Model, Developing Applications with the Task Model, Developing Parameter Sweep Application, Managing Workflows. | 8 |
| 4 | Data Intensive Computing: Map-Reduce Programming, What is Data-Intensive Computing?, Characterizing Data-Intensive Computations, Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing, Storage Systems, Programming Platforms, Aneka MapReduce Programming, Introducing the MapReduce Programming Model, Example Application | 8 |
| 5 | Cloud Platforms in Industry, Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google AppEngine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Applications Scientific Applications, Healthcare: ECG Analysis in the Cloud, , Social Networking, Media Applications, Multiplayer Online Gaming | 8 |
| Total (Hrs) | | 40 |

Course Outcome

Student Should able to :

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|-----|--|
| CO1 | Explain the concepts and terminologies of cloud computing. |
| CO2 | Demonstrate cloud frameworks and technologies. |
| CO3 | Define data intensive computing. |
| CO4 | Demonstrate cloud applications. |

Resources

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|-------------------|--|
| Recommended Books | Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education |
| Reference Books | Cloud Computing Black Book , by Kailash Jayaswal jaganath, kallakurchi, Donald J. Houde. |
| E-Resources | http://nptel.ac.in/ |

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| | |
|--|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Natural Language Processing (Elective-I) | Course Code:CS704TE(II) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

| | |
|---|---|
| 1 | To learn about language processing and its modeling. |
| 2 | To understand the syntactic analysis and its word format. |
| 3 | Extracting the relation from text and word sequence. |
| 4 | Evaluating self explanation in iSTART: Word Matching, Latent Semantic Analysis. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Overview and language modeling: Overview: Origins and challenges of NLP Language and Grammar-Processing Indian Languages- NLP Applications- Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model. | 8 |
| 2 | Word level and syntactic analysis: Word Level Analysis: Regular Expressions- Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction- Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing. | 8 |
| 3 | Extracting Relations from Text: From Word Sequences to Dependency Paths: Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation. Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles: Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labeling, Learning to Annotate Cases with Knowledge Roles and Evaluations. A Case Study in Natural Language Based Web Search: InFact System Overview, The GlobalSecurity.org Experience. | 8 |

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| 4 | <p>Evaluating Self-Explanations in iSTART: Word Matching, Latent Semantic Analysis, and Topic Models: Introduction, iSTART: Feedback Systems, iSTART: Evaluation of Feedback Systems,</p> <p>Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures: Introduction, Cohesion, Coh-Matrix, Approaches to Analyzing Texts, Latent Semantic Analysis, Predictions, Results of Experiments.</p> <p>Automatic Document Separation: A Combination of Probabilistic Classification and Finite-State Sequence Modeling: Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results.</p> <p>Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective Text Mining.</p> | 8 |
| 5 | <p>INFORMATION RETRIEVAL AND LEXICAL RESOURCES: Information Retrieval: Design features of Information Retrieval Systems-Classical, Non classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net- Stemmers-POS Tagger- Research Corpora.</p> | 8 |
| Total (Hrs) | | 40 |

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Analyze the natural language text. |
| CO2 | Define the importance of natural language. |
| CO3 | Understand the concepts Text mining. |
| CO4 | Illustrate information retrieval techniques. |

| Resources | |
|-------------------|---|
| Recommended Books | <ol style="list-style-type: none"> 1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008. 2. Anne Kao and Stephen R. Poteet (Eds), “Natural Language Processing and Text Mining”, Springer-Verlag London Limited 2007. |
| Reference Books | <ol style="list-style-type: none"> 1. Daniel Jurafsky and James H Martin, “Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, 2nd Edition, Prentice Hall, 2008. 2. James Allen, “Natural Language Understanding”, 2nd edition, Benjamin/Cummings publishing company, 1995. 3. Gerald J. Kowalski and Mark.T. Maybury, “Information Storage and Retrieval systems”, Kluwer academic Publishers, 2000. |
| E-Resources | http://nptel.ac.in/ |

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| | |
|---|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Wireless Networking and Mobile Computing (Elective-I) | Course Code:CS704TE(III) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

| | |
|---|---|
| 1 | To understand the concept of mobile communication. |
| 2 | To understand the wireless networking and GSM-Services. |
| 3 | To understand the IP and Mobile IP Network Layer. |
| 4 | To know the basics of Data Organization, Database Transactional Models. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices Mobile System Networks, Data Dissemination, Mobility Management, Security Cellular Networks and Frequency Reuse, Mobile Smartphone, Smart Mobiles, and Systems Handheld Pocket Computers, Handheld Devices, Smart Systems, Limitations of Mobile Devices Automotive Systems | 8 |
| 2 | GSM-Services and System Architecture, Radio Interfaces of GSM, Protocols of GSM Localization, Call Handling Handover, Security, New Data Services, General Packet Radio Service High-speed Circuit Switched Data, DECT, Modulation, Multiplexing, Controlling the Medium Access Spread Spectrum, Frequency Hopping Spread Spectrum (FHSS), Coding Methods, Code Division Multiple Access, IMT-2000 3G Wireless Communication Standards, WCDMA 3G Communications Standards ,CDMMA2000 3G Communication Standards, I-mode, OFDM, High Speed Packet Access (HSPA) 3G Network Long-term Evolution, WiMaxRel 1.0 IEEE 802.16e, Broadband Wireless Access, 4G Networks, Mobile Satellite Communication Networks | 8 |
| 3 | IP and Mobile IP Network Layers, Packet Delivery and Handover Management Location Management, Registration, Tunnelling and Encapsulation, Route Optimization Dynamic Host Configuration Protocol, VoIP, IPsec | 8 |

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| | Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP Mobile TCP, Other Methods of Mobile TCP-layer Transmission ,TCP over 2.5G/3G Mobile Networks | |
| 4 | Data Organization, Database Transactional Models – ACID Rules, Query Processing Data Recovery Process, 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 | 8 |
| 5 | Communication Asymmetry, Classification of Data-delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing techniques, Digital Audio Broadcasting (DAB), Digital Video Broadcasting Synchronization, Synchronization Software for Mobile Devices, Synchronization Software for Mobile Devices SyncML-Synchronization Language for Mobile Computing, Sync4J (Funambol), Synchronized Multimedia Markup Language (SMIL) | 8 |
| Total (Hrs) | | 40 |

Course Outcome

Student Should able to :

| | |
|-----|---|
| CO1 | Understand the various mobile communication systems. |
| CO2 | Describe various multiplexing systems used in mobile computing. |
| CO3 | Explain the use and importance of data synchronization in mobile computing. |

Resources

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|-------------------|--|
| Recommended Books | 1. Raj kamal: Mobile Computing, 2 ND EDITION, Oxford University Press, 2007/2012 2. MartynMallik: Mobile and Wireless Design Essentials, Wiley India, 2003 |
| Reference Books | 1. Ashok Talukder, RoopaYavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010. 2. ItiSahaMisra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009. |
| E-Resources | http://nptel.ac.in/ |

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| | |
|-------------------------------------|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Big Data (Elective-I) | Course Code:CS704TE(IV) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

| | |
|---|---|
| 1 | Understand the Big Data Platform and its Use cases. |
| 2 | Provide an overview of Apache Hadoop. |
| 3 | Provide HDFS Concepts and Interfacing with HDFS. |
| 4 | Understand Map Reduce Jobs |
| 5 | Provide hands on Hadoop Eco System |
| 6 | Apply analytics on Structured, Unstructured Data. |
| 7 | Exposure to Data Analytics with R. |

| Unit Number | Details | Hours |
|-------------|--|-------|
| 1 | INTRODUCTION TO BIG DATA AND HADOOP: Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets. | 10 |
| 2 | HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures. | 10 |
| 3 | Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features. | 10 |

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| 4 | Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction | 10 |
| 5 | Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR. | 10 |
| Total (Hrs) | | 50 |

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Identify Big Data and its Business Implications. |
| CO2 | List the components of Hadoop and Hadoop Eco-System. |
| CO3 | Access and Process Data on Distributed File System. |
| CO4 | Manage Job Execution in Hadoop Environment |
| CO5 | Develop Big Data Solutions using Hadoop Eco System |
| CO6 | Analyze Infosphere BigInsights Big Data Recommendations. |
| CO7 | Apply Machine Learning Techniques using R. |

| Resources | |
|-------------------|---|
| Recommended Books | <ol style="list-style-type: none"> 1. Tom White “ Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012. 2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015. |
| Reference Books | <ol style="list-style-type: none"> 1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007. 2. Jay Liebowitz, “Big Data and Business Analytics” Auerbach Publications, CRC press (2013) 3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw-Hill/Osborne Media (2013), Oracle press. 4. Anand Rajaraman and Jeffrey David Ulman, “Mining of Massive Datasets”, Cambridge University Press, 2012 5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012. |
| E-Resources | http://nptel.ac.in/ |

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|-------------------------------------|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Deep Learning (Elective-I) | Course Code:CS704TE(V) |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

| | |
|---|---|
| 1 | To cover the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks. |
| 2 | To understand long short term memory cells and convolution neural networks. |
| 3 | To implement programming assignments related to these topics. |

| Unit Number | Details | Hours |
|-------------|--|-------|
| 1 | Basics: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm. | 10 |
| 2 | Feedforward Networks: Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders. Deep Neural Networks: Difficulty of training deep neural networks, Greedy layerwise training. | 10 |
| 3 | Better Training of Neural Networks: Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization). Recurrent Neural Networks: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs | 10 |
| 4 | Convolutional Neural Networks: LeNet, AlexNet. Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep | 10 |

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| | Boltzmann Machines. | |
| 5 | Recent trends: Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning Applications: Vision, NLP, Speech (just an overview of different applications in 2-3 lectures) | 10 |
| Total (Hrs) | | 50 |

Course Outcome

Student Should able to :

| | |
|-----|---|
| CO1 | Understand the various biological neuron. |
| CO2 | Describe the feedforward network and deep neural network. |
| CO3 | Explain the Better Training of Neural Networks & Convolutional Neural Networks. |

Resources

| | |
|-------------------|--|
| Recommended Books | Deep Learning Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016. |
| Reference Books | Neural Networks: A Systematic Introduction, Raúl Rojas, 1996 Pattern Recognition and Machine Learning, Christopher Bishop, 2007 |
| E-Resources | http://nptel.ac.in/ |

Sandip University

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| | |
|-------------------------------------|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Data Mining (Elective-I) | Course Code:CS704TE(VI) |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| Tutorial: 1 Hour/Week | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 4 |

Objectives :

| | |
|---|---|
| 1 | Identify the scope and necessity of Data Mining. |
| 2 | To understand Data Mining architecture and KDD. |
| 3 | To understand various Data Mining Rules. |
| 4 | To develop ability to design various algorithms based on data mining tools. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Data Mining: Data mining tasks-Data mining vs KDD, Issues in data mining, Data Mining metrics, Data mining architecture , Data cleaning, Data transformation, Data reduction ,Data mining primitives. | 10 |
| 2 | Data mining knowledge representation : Task relevant data ,Background knowledge ,Interestingness measures ,Representing input data and output knowledge, Visualization techniques, Experiments with Weka - visualization | 11 |
| 3 | Data Mining Techniques:- An Overview: Introduction, Data Mining, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks. | 12 |
| 4 | Association Rule Mining: Introduction, Mining single dimensional Boolean association rules from transactional databases , Mining multi-dimensional association rules. Classification and Prediction: Classification Techniques, Issues regarding classification and prediction, decision tree , Bayesian classification ,Classifier accuracy , Clustering , Clustering Methods - Outlier analysis. | 13 |
| 5 | Applications of Data mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific Applications using Data Mining, Other Applications. | 11 |

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Understand the basic concepts of Date Mining. |
| CO2 | Understand how to mine the relevant data and to house that data. |
| CO3 | To be able to learn about architecture, association and classification of data mining. |

| Resources | |
|-------------------|---|
| Recommended Books | <ol style="list-style-type: none"> 1. Jiawei Han and Micheline Kamber, " Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, USA, 2006. 2. Berson,"Data Warehousing, Data Mining and OLAP", Tata McGraw Hill Ltd, New Delhi, 2004. 3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, , Pearson Education. 4. Arun K Pujari,"Data mining techniques", Oxford University Press, London, 2003. |
| Reference Books | <ol style="list-style-type: none"> 1. Dunham M H,"Data mining: Introductory and Advanced Topics". Pearson Education, New Delhi, 2003. 2. Mehmed Kantardzic," Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003. 3. Soman K. P., Diwakar Shyam, Ajay V., Insight into Data mining: Theory and Practice, PHI 2006. 4. Data Mining and Business Analytics with R, Johannes Ledolter, Wiley, 2013, ISBN: 978-1118447147 (online access via Pitt network) (primary book, hereafter referred as "DMR") 5. Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (2nd ed.), Bing Liu, Springer, 2011, ISBN: 978-3642194597 (available online) (secondary book, hereafter referred as "WDM") 6. Practical Data Science with R, Nina Zumel and John Mount, Manning Publications 2014, ISBN: 9781617291562 (online access via Pitt network) (third book, hereafter referred as "DSR") |
| E-Resources | http://nptel.ac.in/ |

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| | |
|--|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Information & Network Security (Elective-II) | Course Code:CS705TE(I) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|---|
| 1 | To learn about cryptanalysis and taxonomy of cryptanalysis. |
| 2 | To understand the random number generation and hash function. |
| 3 | Understand management of fundamental key length. |
| 4 | To learn about cryptographic application and the secure payment card transaction. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Introduction. How to Speak Crypto. Classic Crypto. Simple Substitution Cipher. Cryptanalysis of a Simple Substitution. Definition of Secure. Double Transposition Cipher. One-time Pad. Project VENONA. Codebook Cipher. Ciphers of the Election of 1876. Modern Crypto History. Taxonomy of Cryptography. Taxonomy of Cryptanalysis. | 8 |
| 2 | What is a Hash Function? The Birthday Problem. Non-cryptographic Hashes. Tiger Hash. HMAC. Uses of Hash Functions. Online Bids. Spam Reduction. Other Crypto-Related Topics. Secret Sharing. Key Escrow. Random Numbers. Texas Hold 'em Poker. Generating Random Bits. Information Hiding. | 8 |
| 3 | Random number generation Providing freshness Fundamentals of entity authentication Passwords Dynamic password schemes Zero-knowledge mechanisms Further reading Cryptographic Protocols Protocol basics From objectives to a protocol Analyzing a simple protocol Authentication and key establishment protocols | 8 |
| 4 | Key management fundamentals Key lengths and lifetimes Key generation Key establishment Key storage Key usage Governing key management Public-Key Management Certification of public keys The certificate lifecycle Public-key management models Alternative approaches | 8 |

| | | |
|-------------|---|----|
| 5 | Cryptographic Applications Cryptography on the Internet Cryptography for wireless local area networks Cryptography for mobile telecommunications Cryptography for secure payment card transactions Cryptography for video broadcasting Cryptography for identity cards Cryptography for home users. | 8 |
| Total (Hrs) | | 40 |

Course Outcome

Student Should able to :

| | |
|-----|--|
| CO1 | Analyze the Digital security lapses. |
| CO2 | Illustrate the need of key management. |
| CO3 | Explain about generating the random key and random management. |
| CO4 | Analyze the cryptographic technique and hash function. |

Resources

| | |
|-------------------|--|
| Recommended Books | Information Security: Principles and Practice, 2nd Edition by Mark Stamp Wiley |
| Reference Books | Applied Cryptography Protocols, Algorithms, and Source Code in C by Bruce Schneier |
| E-Resources | http://nptel.ac.in/ |

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| | |
|--|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Internet of Things (Elective-II) | Course Code: CS705TE(II) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|--|
| 1 | To learn about IoT and its digitization. |
| 2 | To understand the smart object and communication criteria and access technology. |
| 3 | To learn data and analytics for IoT. |
| 4 | To understand the IoT Physical Devices and Endpoints. |

| Unit Number | Details | Hours |
|-------------|--|-------|
| 1 | What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack. | 10 |
| 2 | Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies | 10 |
| 3 | IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods | 10 |
| 4 | Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment | 10 |

| | | |
|-------------|---|----|
| 5 | IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples | 10 |
| Total (Hrs) | | 50 |

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Interpret the impact and challenges posed by IoT networks leading to new architectural models. |
| CO2 | Compare and contrast the deployment of smart objects and the technologies to connect them to network. |
| CO3 | Appraise the role of IoT protocols for efficient network communication. |
| CO4 | Elaborate the need for Data Analytics and Security in IoT. |
| CO5 | Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry. |

| Resources | |
|-------------------|---|
| Recommended Books | David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, " IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things ", 1stEdition, Pearson Education (Cisco Press Indian Reprint). |
| Reference Books | Raj Kamal, " Internet of Things: Architecture and Design Principles ", 1st Edition, McGraw Hill Education, 2017. |
| E-Resources | http://nptel.ac.in/ |

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| | |
|---|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Cryptography & Network Security (Elective-II) | Course Code: CS705TE(III) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|---|
| 1 | To learn about cryptography. |
| 2 | To understand the public key cryptography and RSA. |
| 3 | To learn Key Management and security at different layers. |
| 4 | To understand the wireless LAN Security. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Introduction - Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography –Product Ciphers, DES Construction. | 10 |
| 2 | Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications. | 10 |
| 3 | Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity-based Encryption, Authentication-I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centralised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IP-Sec-Security at the Network Layer – Security at Different layers: Pros and Cons, IPsec in Action, Internet Key Exchange (IKE) Protocol, Security Policy | 10 |

| | | |
|-------------|---|----|
| | and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, OpenSSL. | |
| 4 | IEEE 802.11 Wireless LAN Security - Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Intrusion Detection Systems, DDoS Attacks Prevention/Detection, Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards. | 10 |
| 5 | IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures, Regulation of certifying authorities: Appointment of Controller and Other officers, Digital Signature certificates, Duties of Subscribers, Penalties and adjudication, The cyber regulations appellate tribunal, Offences, Network service providers not to be liable in certain cases, Miscellaneous Provisions. | 10 |
| Total (Hrs) | | 50 |

Course Outcome

Student Should able to :

| | |
|-----|--|
| CO1 | Discuss the cryptography and its need to various applications. |
| CO2 | Design and Develop simple cryptography algorithms. |
| CO3 | Understand the cyber security and need cyber Law. |

Resources

| | |
|-------------------|--|
| Recommended Books | 1. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2017 edition |
| Reference Books | 1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rd Edition, 2017 2. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition 3. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11th reprint, 2018 4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindrakumar, Cengage learning |
| E-Resources | http://nptel.ac.in/ |

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| | |
|--|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Digital Image Processing (Elective-II) | Course Code: CS705TE(IV) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|--|
| 1 | To learn about fundamental of digital image processing. |
| 2 | To understand the Image Enhancement In The Spatial Domain. |
| 3 | To learn Image Enhancement In Frequency Domain. |
| 4 | To understand the Image Segmentation. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Introduction Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing. | 8 |
| 2 | Image Enhancement In The Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods. | 8 |
| 3 | Image Enhancement In Frequency Domain: Introduction, Fourier Transform, Discrete Fourier Transform (DFT), properties of DFT , Discrete Cosine Transform (DCT), Image filtering in frequency domain. | 8 |
| 4 | Image Segmentation: Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold. | 8 |

| | | |
|-------------|--|----|
| 5 | Image Compression: Introduction, coding Redundancy , Inter-pixel redundancy, image compression model, Lossy and Lossless compression, Huffman Coding, Arithmetic Coding, LZW coding, Transform Coding, Sub-image size selection, blocking, DCT implementation using FFT, Run length coding. | 8 |
| Total (Hrs) | | 40 |

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Explain fundamentals of image processing. |
| CO2 | Compare transformation algorithms. |
| CO3 | Contrast enhancement, segmentation and compression techniques. |

| Resources | |
|-------------------|--|
| Recommended Books | 1. Rafael C G., Woods R E. and Eddins S L, Digital Image Processing, Prentice Hall, 3 rd edition, 2008 |
| Reference Books | 1. Milan Sonka, "Image Processing, analysis and Machine Vision", Thomson Press India Ltd, Fourth Edition. 2. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India. 3. S. Sridhar , Digital Image Processing, Oxford University Press, 2 nd Ed, 2016. |
| E-Resources | http://nptel.ac.in/ |

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| | |
|--|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Distributed System (Elective-II) | Course Code: CS705TE(IV) |
| | |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|---|
| 1 | To learn the computation model of synchronous and asynchronous systems. |
| 2 | To understand the basic concepts of programming model. |
| 3 | To be able to understand the security and authentication of prescribed model. |
| 4 | To learn the concepts of algorithm and mutual exclusion technique. |
| 5 | To be able to understand the distributed object and databases. |

| Unit Number | Details | Hours |
|-------------|--|-------|
| 1 | Basic concepts. Models of computation: shared memory and message passing systems, synchronous and asynchronous systems. Logical time and event ordering. | 10 |
| 2 | Global state and snapshot algorithms, mutual exclusion, clock synchronization, leader election, deadlock detection, termination detection, spanning tree construction. | 9 |
| 3 | Programming models: remote procedure calls, distributed shared memory. Fault tolerance and recovery: basic concepts, fault models, agreement problems and its applications, commit protocols, voting protocols, check pointing and recovery, reliable communication. | 11 |
| 4 | Security and Authentication: basic concepts, Kerberos. Resource sharing and load balancing. | 10 |
| 5 | Special topics: distributed objects, distributed databases, directory services, web services. | 10 |
| Total (Hrs) | | 50 |

| Course Outcome | |
|--------------------------|---|
| Student Should able to : | |
| CO1 | Explain the basic concepts of computation. |
| CO2 | Explain the Global state and programming model. |
| CO3 | Explain Security and Authentication process. |

| Resources | |
|-------------------|---|
| Recommended Books | <p>Mukesh Singhal and Niranjan Shivaratri, Advanced Concepts in Operating Systems, McGraw-Hill.</p> <p>Nancy Lynch, Distributed Algorithms, Morgan Kaufmann.</p> <p>Andrew S. Tanenbaum, Distributed Operating Systems, ACM Press.</p> <p>Jie Wu, Distributed Systems, CRC Press.</p> |
| Reference Books | <p>Hagit Attiya, Jennifer Welch, Distributed Computing: Fundamentals, Simulations and Advanced Topics, McGraw-Hill.</p> <p>Sape Mullender (ed.), Distributed Systems, Addison-Wesley.</p> |

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| | |
|---|--|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Information Retrieval (Elective-II) | Course Code: CS705TE(IV) |
| Theory : 3 Hrs/Week | Max. University Theory Examination: 60 Marks |
| | Continuous Internal Assessment: 40 Marks |
| Max. Time for Theory Exam.: 2.5 Hrs | Credit: 3 |

Objectives :

| | |
|---|--|
| 1 | To learn about fundamental of digital image processing. |
| 2 | To understand the Image Enhancement In The Spatial Domain. |
| 3 | To learn Image Enhancement In Frequency Domain. |
| 4 | To understand the Image Segmentation. |

| Unit Number | Details | Hours |
|-------------|---|-------|
| 1 | Introduction Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing. | 8 |
| 2 | Image Enhancement In The Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods. | 8 |
| 3 | Image Enhancement In Frequency Domain: Introduction, Fourier Transform, Discrete Fourier Transform (DFT), properties of DFT , Discrete Cosine Transform (DCT), Image filtering in frequency domain. | 8 |
| 4 | Image Segmentation: Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold. | 8 |
| 5 | Image Compression: Introduction, coding Redundancy , Inter-pixel redundancy, image compression model, Lossy and Lossless compression, Huffman Cod- | 8 |

| | |
|--|----|
| ing, Arithmetic Coding, LZW coding, Transform Coding, Sub-image size selection, blocking, DCT implementation using FFT, Run length coding. | |
| Total (Hrs) | 40 |

| Course Outcome | |
|--------------------------|--|
| Student Should able to : | |
| CO1 | Explain fundamentals of image processing. |
| CO2 | Compare transformation algorithms. |
| CO3 | Contrast enhancement, segmentation and compression techniques. |

| Resources | |
|-------------------|--|
| Recommended Books | 1. Rafael C G., Woods R E. and Eddins S L, Digital Image Processing, Prentice Hall, 3 rd edition, 2008 |
| Reference Books | 1. Milan Sonka, "Image Processing, analysis and Machine Vision", Thomson Press India Ltd, Fourth Edition. 2. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India. 3. S. Sridhar , Digital Image Processing, Oxford University Press, 2 nd Ed, 2016. |
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| | |
|---|---|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Principle of Programming Language Lab | Course Code:CS706P |
| | Max. University Practical Examination: 25 Marks |
| Practical : 3 Hrs/Week | Term Work : 25 Marks |
| Max. Time for Exam.: 3 Hrs | Credit: 1 |

Practical Objectives :

| | |
|---|--|
| 1 | Overview of Rule Based Programming Language. |
| 2 | Basic Concept of Lisp Language. |
| 3 | Advance Programming. |

| Sr. No. | Practical Description |
|---------|--|
| 1 | Define a LISP function to compute sum of squares. |
| 2 | Define a LISP function to compute difference of squares. (if $x > y$ return $x^2 - y^2$, otherwise $y^2 - x^2$). |
| 3 | Define a Recursive LISP function to solve Ackermann's Function. |
| 4 | Define a Recursive LISP function to compute factorial of a given number. |
| 5 | Define a Recursive LISP function which takes one argument as a list and returns last element of the list. (Do not use last predicate). |
| 6 | Define a Recursive LISP function which takes one argument as a list and returns a list except last element of the list. (Do not use but last predicate). |
| 7 | Define a Recursive LISP function which takes one argument as a list and returns reverse of the list. (Do not use reverse predicate). |
| 8 | Define a Recursive LISP function which takes two arguments first, an atom, second, a list, returns a list after. |

Notes

| | |
|---|---|
| 1 | Each student should perform at least 07 experiments from the list of experiments. First five experiments are compulsory. Any 2 experiments are to be conducted from |
|---|---|

| | |
|---|--|
| | experiment no. 6 to 9. |
| 2 | The experiments from the regular practical syllabus will be performed. |
| 3 | The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly. |
| 4 | Good Laboratory Practices . |

Practical/Oral/Presentation:

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University.

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| | |
|----------------------------------|---|
| School: Engineering & Technology | Programme: B.Tech (Computer science & Engg.) |
| Year: Fourth Year | Semester –VII |
| Course: Project Work (Phase- I) | Course Code: CS 707P |
| | |
| | Max. University Practical Examination: 25 Marks |
| Practical : 3 Hrs/Week | Term Work: 25 Marks |
| Max. Time for Exam.: 3 Hrs | Credit: 1 |

Practical Objectives :

| | |
|---|---|
| 1 | To develop skills for carrying literature survey and organize the material in proper manner. |
| 2 | To provide opportunity of designing and building complete system/subsystem based on their knowledge acquired during graduation. |
| 3 | To understand the needs of society and based on it to contribute towards its betterment and to learn to work in a team. |

| Sr. No. | Practical Description |
|---------|--|
| 1 | Project shall be assigned to students at the start of VII th semester. There should not usually be more than 3 students in batch. The project should be based on latest technology as far as possible and it may be hardware or/and software based. The assessment of performance of students should be made at least twice in the semester. Students should be encouraged to present their progress of project using LCD projector. |

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| | |
|----------------------------------|---|
| School: Engineering & Technology | Programme: B.Tech (Computer Science & Engg.) |
| Year: Fourth Year | Semester -VII |
| Course: Professional Skills | Course Code:CS708P |
| | Max. University Practical Examination: 10 Marks |
| Practical : 3 Hrs/Week | Lab Continuous Internal Assessment: 15 Marks |
| Max. Time for Exam.: 3 Hrs | Credit: 1 |

Practical Objectives :

| | |
|---|---|
| 1 | Developing working in teams. |
| 2 | Use effective presentation techniques. |
| 3 | Apply techniques of effective time management. |
| 4 | Apply problem solving skills for a given situation. |

| Sr. No. | Practical Description |
|---------|---|
| | <p>SOCIAL SKILLS : Society, Social Structure, Develop Sympathy And Empathy</p> <p>❖ INTER PERSONAL RELATION: Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.</p> <p>❖ PROBLEM SOLVING :</p> <p>I. Steps In Problem Solving : 1)Identify And Clarify The Problem, 2)Information Gathering Related To Problem, 3)Evaluate The Evidence, 4)Consider Alternative Solutions And Their Implications, 5)Choose And Implement The Best Alternative, 6)Review</p> <p>II. Problem Solving Technique.(Any One Technique May Be Considered): 1) Trial And Error 2) Brain Storming 3) Lateral Thinking</p> <p>❖ PRESENTATION SKILLS: Body language - Dress like the audience Posture, Gestures, Eye contact and facial expression. Presentation Skill – Stage Fright Voice and language – Volume, Pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language, Practice of speech. Use of aids –OHP,LCD projector, white board</p> <p>❖ LECTURES BY PROFESSIONAL / INDUSTRIAL EXPERT : To be organized from Any Three of the following areas :</p> <p>i) Use of a ready mix concrete in construction.</p> <p>ii) Specific civil Engineering applications.</p> <p>iii) Use of lifts and escalators in high rise buildings.</p> <p>iv) Building bylaws for municipal area.</p> <p>v) Computer aided drafting.</p> |

vi) New Building materials.(PVC sanitary fittings, Aluminum wall paneling, colored glass, water proofing compounds)

vii) Composite Materials.

viii) Ceramics

ix) GPS/GIS x) Safety Engineering and Waste elimination

❖ **INDIVIDUAL ASSIGNMENTS** : Any two from the list suggested –

a) Process sequence of building construction.

b) Write material specifications for any two construction material.

c) Layout of three room simple building.

d) Preparing models using development of surfaces.

e) Assignments on bending moment, shear forces, strength of material.

f) Select different materials with specifications for at least 10 different civil engineering material components and list the important desirable properties of the material.

g) Select 5 different structural steels and alloy steels used in civil engineering constructions.

h) List the various properties and applications of following materials – a. Ceramics, b. fiber reinforcement plastics, c. thermo plastics, d. thermo setting plastics, e. rubbers, f. tar steel g. TMT.

OR

Conduct Any One of the following activities through active participation of students and write report

i) Rally for energy conservation / tree plantation.

ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.

iii) Conduct aptitude, general knowledge test, IQ test.

iv) Arrange any one training in the following areas : a) Yoga. B) Use of firefighting equipment and First aid Maintenance of Domestic appliances.

❖ **GROUP DISCUSSION AND INTERVIEW TECHNIQUE**: Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making. The students should discuss in a group of six to eight students and write a brief report on the same as a part of term work. Two topics for group discussions may be selected by the faculty members. Some of the suggested topics are - i) Sports

ii) Current news items iii) Discipline and House Keeping iv) Current topics related to mechanical engineering field.

❖ **WORKING IN TEAM**: Understand And Work Within The Dynamics Of A Groups. Tips To Work Effectively In Teams, Establish Good Rapport, Interest With Others And Work Effectively With Them To Meet Common Objectives, Tips To Provide And Accept Feedback In A Constructive And Considerate Way, Leadership In Teams and Handling Frustrations In Group.

| Notes | |
|-------|--|
| 1 | Each student should perform at least 8 experiments from the list of experiments. |
| 2 | The experiments from the regular practical syllabus will be performed |
| 3 | The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly. |
| 4 | Minimum two tutorials must be conducted from the remaining list of experiments. |

Practical/Oral/Presentation:

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University.