



# PRAGATI ENGINEERING COLLEGE AUTONOMOUS

DEPARTMENT OF INFORMATION TECHNOLOGY



## COURSE STRUCTURE FOR IV Year I Semester

S.No	Subject Code	Subject	L	T	P	C
1	16BH7T15	Management Science	4	-	-	3
2	16CS7T19	Cryptography and Network Security	4	-	-	3
3	16IT7T16	Mobile Computing	4	-	-	3
4	16IT7T17	Open Source Software	4	-	-	3
5	16IT7D01 16IT7D02 16IT7D03 16IT7D04 16IT7D05 16IT7D06	<b>Elective-I:</b> i. Data Analytics ii. Information Retrieval Systems iii. Distributed Systems iv. Design Patterns v. Software Quality Assurance vi. Computer Graphics	4	-	-	3
6	16IT7D07 16IT7D08 16IT7D09 16IT7D10 16IT7D11 16IT7D12	<b>Elective-II:</b> i. Image Processing ii. Human Computer Interaction iii. Machine Learning iv. Decision Support System v. Artificial Neural Networks vi. E-Commerce	4	-	-	3
7	16IT7L10	Mobile Computing Lab	-	-	3	2
8	16IT7L11	Open Source Software Lab	-	-	3	2
		<b>Total Credits</b>				<b>22</b>



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## COURSE STRUCTURE FOR IV Year II Semester

S.No	Subject Code	Subject	L	T	P	C
1	16IT8T18	Cloud Computing	4	-	-	3
2	16IT8T19	Cyber Security	4	-	-	3
3	16IT8T20	Data Warehousing and Business Intelligence	4	-	-	3
4	16IT8D13 16IT8D14 16IT8D15 16IT8D16 16IT8D17 16IT8D18	<b>Elective-III:</b> i. Agile Methodologies ii. Internet Of Things iii. Computer Vision iv. Multimedia Programming v. Social Networking & Semantic Web vi. Concurrent & Parallel Programming	4	-	-	3
5	16IT8S01	Seminar	-	3	-	2
6	16IT8P03	Project work	-	-	-	10
		<b>Total Credits</b>				<b>24</b>



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16BH7T15

#### MANAGEMENT SCIENCE (Common to Civil, ECE, EEE, CSE, IT)

##### Course Outcomes:

At the end of the course, student will be able to

CO1 (Comprehension): Recognize management thoughts, motivational theories and types of organizations

CO2 (Application): Apply the concepts of operations Management, such as Control Charts, work study, materials management for smooth functioning of production units.

CO3(Evaluation): Appraise the role of functional management in maximizing profits.

CO4 (Application): Apply techniques of Project Management in controlling cost.

CO5 (Application): Apply principles of Strategic Management for managerial decisions.

CO6 (Comprehension): Classify the management practices with reference to current business scenario.

##### Unit I

Introduction to Management: Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making Process- Designing organization structure- Principles of organization - Types of organization structure.

##### Unit II

Operations Management: Production Management-functions– Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart). Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

##### Unit III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Job Evaluation and Merit Rating, Balanced Score Card – Team Dynamics/Working in Teams - Marketing Management- Functions of Marketing – Marketing strategies based on Product Life Cycle.

##### Unit IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

##### Unit V

Entrepreneurship Management & Strategic Management: Entrepreneurship- features- Financial Institutions facilitating entrepreneurship – Startup culture. Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives.



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#### Unit VI

Introduction to Contemporary Management Practices: Basic concepts of MIS, Just In Time (JIT) system, Total Quality Management (TQM), Lean Six Sigma, People Capability Maturity Model, Supply Chain Management, Evolution of Enterprise Systems, Business Process Outsourcing (BPO), Business Process Re-Engineering.

#### Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, 'Management Science' TMH 2011.

#### REFERENCES

1. Koontz & Weihrich: 'Essentials of Management' TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011.
3. Robbins: Organizational Behaviors, Pearson Publications, 2011
4. Kanishka Bedi: Production & Operational Management, Oxford Publications, 2011.
5. Manjunath: Management Science, Pearson Publications, 2013.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Strategic Management, Cengage Learning.
8. Dr. PG. Ramanujam, BVR Naidu, PV Rama Sastry : Management Science Himalaya Publishing House, 2013.
9. Management Shapers, Universities Press.
10. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
11. Principles of management and administration, D. Chandra Bose, Prentice Hall of India Pvt. Ltd. New Delhi.
12. Patterns of Entrepreneurship Management, Jack M. Kaplan.



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16CS7T19

#### CRYPTOGRAPHY AND NETWORK SECURITY (Common to CSE and IT)

##### **Learning Objectives:**

Understand symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), public-key cryptography (RSA, discrete logarithms).

##### **Course Outcomes:**

At the end of this course student will be able to-

1. Analyze the functional units of security model.(Analyze)
2. Evaluate security mechanisms with Symmetric Key cryptography. (Evaluate)
3. Evaluate security mechanisms with Asymmetric Key cryptography. (Evaluate)
4. Analyze Data Integrity, Digital Signature Schemes & Key Management. (Analyze)
5. Analyze network security models for ensuring security at Application layer and Transport layer. (Analyze)
6. Analyze network security model at Network layer (Analyze)

##### **UNIT- I:**

Classical Encryption Techniques

Security attacks, services & mechanisms, Network Security Model, Non-Cryptographic Protocol Vulnerabilities, Cryptography basics, Symmetric Cipher Model, Cryptanalysis and brute force attacks, Substitution and transposition techniques.

##### **UNIT- II**

Block Ciphers & Symmetric Key Cryptography

Stream ciphers & Block ciphers, Feistel Cipher, DES, Triple DES, AES.

##### **UNIT- III**

Number Theory & Asymmetric Key Cryptography

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptosystems, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

##### **UNIT- IV**

Cryptographic Hash Functions & Digital Signatures

Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm(SHA-512), Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.



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#### UNIT -V

Network Security-I (Transport Layer Security & Email Security)

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH)

Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

#### UNIT -VI

Network Security-II

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS.

#### TEXT BOOKS:

1. "Cryptography & Network Security: Principles and Practices," William Stallings, PEA, Sixth edition, 2006.
2. "Introduction to Computer Networks & Cyber Security," Chwan Hwa Wu, J.David Irwin, CRC press, 2016.

#### REFERENCE BOOKS:

1. "Network Security and Cryptography," Bernard Meneges, Cengage Learning, 2012.
2. "Everyday Cryptography," Keith M.Martin, Oxford, 2<sup>nd</sup> edition, 2017.
3. "Cryptography and Network Security," Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc Graw Hill, 3<sup>rd</sup> edition, 2008.

#### Web Resources

1. <http://nptel.ac.in/courses/106105031> (Prof. D. Mukhopadhyay, IIT, Kharagpur)
2. <http://williamstallings.com/Extras/Security-Notes/>



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16IT7T16

#### MOBILE COMPUTING

#### COURSE OBJECTIVES:

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- Understand the issues and solutions of various layers of mobile network Layers.

#### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare and contrast GSM and GPRS services.
CO2	Analyze various protocols like SDMA, FDMA, CDMA, etc.
CO3	Distinguish between IP and mobile IP Network layer.
CO4	Differentiate various transport layer protocols for mobile networks.
CO5	Analyze Data Dissemination and Synchronization.
CO6	Examine various MANET routing algorithms.

#### UNIT I:

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices, GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

#### UNIT II:

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11).

#### UNIT III:

**Mobile Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

#### UNIT IV:

**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues:** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.



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#### UNIT V:

**Data Dissemination:** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods.

**Data Synchronization:** Introduction, Software, and Protocols.

#### UNIT VI:

**Mobile Ad hoc Networks (MANETs):** Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, Mobile Agents, Service Discovery.

#### TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009. (Unit 2)
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772 (Unit 1,3,4,5,6)

#### REFERENCE BOOKS:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
2. UWE Hansmann, Lothar Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

#### WEB LINKS:

1. [http://www.tutorialspoint.com/mobile\\_computing/index.htm](http://www.tutorialspoint.com/mobile_computing/index.htm)
2. [http://en.wikipedia.org/wiki/Mobile\\_computing#Definitions](http://en.wikipedia.org/wiki/Mobile_computing#Definitions)
3. <http://nptel.ac.in/courses/106106147/>
4. [https://onlinecourses.nptel.ac.in/noc16\\_cs13/preview](https://onlinecourses.nptel.ac.in/noc16_cs13/preview)





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16IT7T17

#### OPEN SOURCE SOFTWARE

#### COURSE OBJECTIVES:

- To provide a basic idea of Open source technology, their software development process so as to understand the role and future of open source software in the industry along with the impact of legal, economic and social issues for such software.

#### COURSE OUTCOMES:

The Student will be able to:	
CO1	Classify about Linux shell and its file structure.
CO2	Build Angular JS web Application
CO3	Write Programs using jQuery.
CO4	Demonstrate Ruby on Rails applications.
CO5	Create Nosql database programs using MongoDB
CO6	Classify about HBase.

#### UNIT I:

**Linux:** Introduction to Linux ,Linux Distributions ,Operating Systems and Linux ,History of Linux and Unix ,Unix ,Linux ,Linux Overview, Open Source Software

**The Linux Shell and File Structure:** The Shell, the Command Line, Filename Expansion, Standard Input/ Output and Redirection

#### UNIT II:

**Angular JS:** What Is AngularJS, Data Binding and Your First Angular JS Web Application, Simple Data Binding, Best Data Binding Practices Modules, Scopes, Controllers, Expressions

#### UNIT-III:

**j Query:** Our First jQuery Document, **Selectors**-The Document Object Model ,The \$() Factory Function CSS Selectors, XPath Selectors, Custom Selectors ,DOM Traversal Methods ,Accessing DOM Element

#### UNIT-IV:

**Ruby on rails:** Ruby: Ruby, Ruby Gems, Rails, and Git, The First Application, rails server, Model-View-Controller (MVC) Installation and Setup, Planning the Application, A Demo App

#### UNIT-V:

**Mongo DB:** Getting and Starting MongoDB, Introduction to the MongoDB Shell, Running the Shell , A MongoDB Client, Basic Operations with the Shell ,Data Types , Basic Data Types ,Dates ,Arrays., Embedded Documents\_id and Object Ids, Using the MongoDB Shell, Running Scripts with the Shell Creating a .mongorc.js, Customizing Your Prompt.

**Creating, Updating, and Deleting Documents** Inserting and Saving Documents, Batch Insert, Insert Validation, Removing Documents, Remove Speed, Updating Documents



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#### UNIT VI:

**HBase: Installation-**Requirements, File systems for Hbase, Installation Choices, Run Modes, Configuration, Deployment, Operating a Cluster.

**Client API the Basics:** CRUD Operations-Put Method, Get Method, Delete Method

#### TEXT BOOKS:

1. Linux: The Complete Reference, Sixth Edition Richard Petersen by Mc GrawHill (Unit-1)
2. AngularJS: ng-book The Complete Book on AngularJS Ari Lerner(Unit-2)
3. jQuery: Learning jQuery Better Interaction Design and Web Development with Simple JavaScript Techniques by Jonathan Chaffer Karl Swedberg ( Unit-3)
4. RUBY ON RAILS™ 3TUTORIAL Learn Rails™ by Example Michael Hart(Unit-4)
5. Mongo DB: MongoDB: The Definitive Guide, 2nd Edition Powerful and Scalable Data Storage by Kristina Chodorow, O'Reilly Media.( Unit 5)
6. HBase: The Definitive Guide by Lars George O'Reilly Media(Unit-6)

#### REFERENCES:

1. Web Development with MongoDB and NodeJS - Second Edition
2. AngularJS 1st Edition by Brad Green (Author), Shyam Seshadri (Author)

#### WEB LINKS:

1. [http://www.khuisf.ac.ir/prof/images/Uploaded\\_files/Linux%20The%20Complete%20Reference.6th.Edition\(Nov.2007\)\[2842313\].PDF](http://www.khuisf.ac.ir/prof/images/Uploaded_files/Linux%20The%20Complete%20Reference.6th.Edition(Nov.2007)[2842313].PDF)
2. [https://www.kopykitab.com/ebooks/2016/06/7677/sample/sample\\_7677.pdf](https://www.kopykitab.com/ebooks/2016/06/7677/sample/sample_7677.pdf)
3. [https://www.e-reading.club/bookreader.php/142087/Learning\\_jQuery.pdf](https://www.e-reading.club/bookreader.php/142087/Learning_jQuery.pdf)
4. <http://pepa.holla.cz/wp-content/uploads/2015/10/ng-book-The-Complete-Book-on-AngularJS.pdf>
5. [file:///H:/ruby\\_on\\_rails\\_3\\_tutorial.pdf](file:///H:/ruby_on_rails_3_tutorial.pdf)  
[http://usuaris.tinet.cat/bertolin/pdfs/mongodb\\_%20the%20definitive%20guide%20-%20kristina%20chodorow\\_1401.pdf](http://usuaris.tinet.cat/bertolin/pdfs/mongodb_%20the%20definitive%20guide%20-%20kristina%20chodorow_1401.pdf)

#### For AngularJS:

1. [file:///C:/Users/SivaBaba/Desktop/angularjs\\_tutorial.pdf](file:///C:/Users/SivaBaba/Desktop/angularjs_tutorial.pdf)
2. <http://www.longevity.co.uk/media/1008/angularjs-novice-to-ninja.pdf>
3. <http://file.allitebooks.com/20150811/Professional%20AngularJS.pdf>

#### For Mongo DB:

1. <https://www.coursera.org/learn/introduction-mongodb>
2. [https://the-eye.eu/public/Books/IT%20Various/mongodb\\_the\\_definitive\\_guide.pdf](https://the-eye.eu/public/Books/IT%20Various/mongodb_the_definitive_guide.pdf)
3. [http://usuaris.tinet.cat/bertolin/pdfs/mongodb\\_%20the%20definitive%20guide%20-%20kristina%20chodorow\\_1401.pdf](http://usuaris.tinet.cat/bertolin/pdfs/mongodb_%20the%20definitive%20guide%20-%20kristina%20chodorow_1401.pdf)

#### Hbase:

1. <http://www.mpam.mp.br/attachments/article/6214/HBase%EF%BC%9AThe%20Definitive%20Guide.pdf>



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#### ELECTIVE-I

16IT7D01

#### I.DATA ANALYTICS

##### COURSE OBJECTIVES:

- Students will know about Big data Platform and its evolution
- Students will learn about Data analytics models
- Students will know about stream models and architectures
- Students will analyze about clustering
- Students learn about different frameworks and new technologies

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Develop Java Programs using Generic classes and Type Parameters.
CO2	Compare Google File System and Hadoop Distributed File Systems.
CO3	Write programs based on map reduce framework.
CO4	Build Hadoop I/O programs.
CO5	Interpret about pig architecture and its implementation.
CO6	Design a data analytical system using HIVE.

##### UNIT I:

**Data structures in Java:** Linked List, Stacks, Queues, Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization.

##### UNIT- II:

**Working with Big Data:** Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

##### UNIT III:

**Writing MapReduce Programs:** A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

##### UNIT IV:

**Hadoop I/O:** The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collection.



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#### UNIT V:

**Pig:** Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

#### UNIT VI:

**Applying Structure to Hadoop Data with Hive:** Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

#### TEXT BOOKS:

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael Coss

#### REFERENCES:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne.

#### WEB LINKS:

1. <https://cognitiveclass.ai/courses/introduction>
2. <https://www.tutorialspoint.com/hadoop/index.htm>
3. [Hadoop: http://hadoop.apache.org/](http://hadoop.apache.org/)
4. [Hive: https://cwiki.apache.org/confluence/display/Hive/Home](https://cwiki.apache.org/confluence/display/Hive/Home)
5. [Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html](http://pig.apache.org/docs/r0.7.0/tutorial.html)



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16IT7D02

## II. INFORMATION RETRIEVAL SYSTEMS

### COURSE OBJECTIVES:

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines
- To provide hands-on experience in evaluating search engines.

### COURSE OUTCOMES:

The Student will be able to:	
CO1	Identify the terminology used in Information retrieval systems and basic data structures used.
CO2	Use inverted files to build IR systems.
CO3	Classify signature file usability in retrieving of information.
CO4	Operate on IR system using PAT Trees and PAT arrays.
CO5	Use stemming algorithms for the search and retrieval of information.
CO6	Construct Thesauri from text that is used in information retrieval.

### UNIT I:

Introduction to Information Storage and Retrieval System: Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

### UNIT II:

Inverted files: Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

### UNIT III:

Signature Files: Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

### UNIT IV:

New Indices for Text: PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

### UNIT V:

Stemming Algorithms: Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files.



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### UNIT VI:

Thesaurus Construction: Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts.

### TEXT BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval- Yates, Pearson Education.
3. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.

### REFERENCE BOOKS:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Information retrieval Algorithms and Heuristics, Grossman, David A., Frieder, Ophir 2ed, Springer

### WEB LINKS:

1. <http://cse.iitkgp.ac.in/~pabitra/course/ir06/ir06.html>
2. <https://classes.soe.ucsc.edu/ism293/Spring09/material/Lecture%202.pdf>
3. [http://videlectures.net/Top/Computer\\_Science/Information\\_Retrieval/](http://videlectures.net/Top/Computer_Science/Information_Retrieval/)



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16IT7D03

### III. DISTRIBUTED SYSTEMS

#### COURSE OBJECTIVES:

- Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles

#### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare various System Models.
CO2	Differentiate between TCP and UDP communication.
CO3	Analyze the process of Remote Method Invocation.
CO4	Compare and Contrast between Processes and Threads.
CO5	Analyze the difference between Napster and Peer-to-Peer distributed file systems.
CO6	Analyze Concurrency control and Deadlocks in Distributed transactions.

#### UNIT-I:

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

#### UNIT-II:

**Interprocess Communication:** Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

#### UNIT-III:

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects- Object Model, Distributed Object Model, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI





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#### UNIT-IV:

**Operating System Support:** Introduction, the Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

#### UNIT-V:

**Distributed File Systems:** Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

#### UNIT-VI:

**Transactions & Replications:** Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication- Introduction, Passive (Primary) Replication, Active Replication.

#### TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems- Concepts and Design”, Fourth Edition, Pearson Publication
2. Ajay D Kshemkalyani, Mukesh Siglal, “Distributed Computing, Principles, Algorithms and Systems”, Cambridge

#### REFERENCE BOOKS:

1. “Distributed Computing: Fundamentals, Simulations and Advanced Topics” by Hagit Attiya, Jennifer Welch
2. “Distributed Systems – Principles and Paradigms” by Andrew S. Tanenbaum, Maaten Van Steen, 2<sup>nd</sup> Edition, Pearson.

#### WEB LINKS:

1. <http://nptel.ac.in/courses/106106107/>
2. <http://www.hpcs.cs.tsukuba.ac.jp/~tatebe/lecture/h23/dsys/dsd-tutorial.html>
3. <https://www.techopedia.com/definition/18909/distributed-system>





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16IT7D04

#### IV. DESIGN PATTERNS

##### COURSE OBJECTIVES:

- To introduce the fundamental concepts of design patterns.
- To explain principles, practices and approaches to make good designs using design patterns.
- To provide knowledge on various design patterns such as composite, iterator, observer, factory method and strategy.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Relate design Problems with Design Patterns.
CO2	Analyze the application of design patterns in the context of the Design of a Document Editor.
CO3	Compare creational patterns like Abstract Factory, Singleton Design patterns etc.,
CO4	Compare structural patterns like Adapter, Façade Design patterns etc.,
CO5	Compare behavioral patterns like command, Template Method etc.,
CO6	Decide the expectation from the usage of Design Patterns.

##### UNIT I:

**Introduction:** Design Pattern, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

##### UNIT II:

**A Case Study:** Designing a Document Editor, Design Problems, and Document Structure, Formatting, Embellishing the User Interface, and Supporting Multiple Look and Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

##### UNIT III:

**Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

##### UNIT IV:

**Structural Patterns:** Adapter, Bridge, and Composite, Decorator, Façade, Flyweight, Proxy.

##### UNIT V:

**Behavioral Patterns:** Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns.



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### UNIT VI:

What to Expect from Design Patterns, A Brief History, The Pattern Community an Invitation, A Parting Thought. Case study: Document Editor

### TEXT BOOK:

1. Design Patterns, Erich Gamma, Pearson Education.

### REFERENCE BOOKS:

1. Pattern's in JAVA Vol-I By Mark Grand ,WileyDreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand ,WileyDreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,WileyDreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd.
5. Design Patterns Explained By Alan Shalloway, Pearson Education.

### WEB LINKS:

1. [www.cse.wustl.edu/~cdgill/courses/cse432\\_sp06/CreationalPatterns.ppt](http://www.cse.wustl.edu/~cdgill/courses/cse432_sp06/CreationalPatterns.ppt)
2. <https://msdn.microsoft.com/en-us/library/orm-9780596527730-01-05.aspx>
3. [https://sourcemaking.com/design\\_patterns/structural\\_patterns](https://sourcemaking.com/design_patterns/structural_patterns)
4. <http://www.oodeesign.com/structural-patterns/>
5. <https://www.codeproject.com/Articles/455228/Design-Patterns-of-Behavioral-Design-Patterns>



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16IT7D05

### V. SOFTWARE QUALITY ASSURANCE

#### COURSE OBJECTIVES:

- Describe approaches to quality assurance
- Understand quality models
- Evaluate the system based on the chosen quality model

#### COURSE OUTCOMES:

The Student will be able to:	
CO1	Enumerate the Components of the Software Quality Assurance System.
CO2	Integrate Quality Activities in the Project Life Cycle
CO3	Interpret procedures and work instructions.
CO4	List out the Software Quality Metrics and Costs.
CO5	Analyze the SQA Standards.
CO6	Estimate the Role of Management in Quality Assurance.

#### UNIT I:

**Introduction:** The Software Quality Challenge, Software Quality

**Software Quality Factors:** The Components of the Software Quality Assurance System - Overview

**Pre-Project Software Quality Components.**

#### UNIT II:

**SQA Components in the Project Life Cycle:**

Integrating Quality Activities in the Project Life Cycle, Reviews Software Testing – Strategies Software Testing –Implementation, Assuring the Quality of Software Maintenance.

#### UNIT III:

**Software Quality Infrastructure Components:**

Procedures and Work Instructions, Supporting Quality Devices Staff Training, Instructing and Certification. Preventive and Corrective Actions.

#### UNIT IV:

**Software Quality Management Components:**

Project Progress Control: Software Quality Metrics, Software Quality Costs.

#### UNIT V:

**Standards, Certification and Assessment:**

SQA Standards ISO 9001 Certification Software, Process Assessment.



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### UNIT VI:

#### Organizing for Quality Assurance:

Management and its Role in Quality Assurance, The Software Quality Assurance.

#### TEXT BOOKS:

1. Software Quality Assurance, Theory of implementation-Daniel Galin, Pearson
2. MauroPezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008.

#### REFERENCE BOOKS:

1. BorizBeizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
2. Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008
3. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008
4. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson, 2003
5. KshirasagarNaik and PriyadarshiTripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008

#### WEB LINKS:

1. [softwaretestingfundamentals.com/software-quality-assurance/](http://softwaretestingfundamentals.com/software-quality-assurance/)
2. <http://nptel.ac.in/courses/106101061/>



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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT7D06

#### VI. COMPUTER GRAPHICS

##### COURSE OBJECTIVES:

- To understand the basic principles of implementing computer graphics primitives.
- To develop and design problem solving skills with application to computer graphics.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare line drawing algorithms (Bresenham's and DDA Line Derivations and algorithms).
CO2	Analyze different 2-D geometrical transforms for scaling, translation, rotation etc.
CO3	Compare line clipping and polygon clipping algorithms.
CO4	Perform 3-D transformation.
CO5	Build Graphics programs using OPENGL.
CO6	Intersect rays with primitives.

##### UNIT I:

Introduction: Application of Computer Graphics, raster scan systems, random scan systems, Raster scans display processors. Output primitives: Points and lines, line drawing algorithms( Bresenham's and DDA Line Derivations and algorithms), mid-point circle and ellipse algorithms.

##### UNIT II:

**Filled area primitives:** Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms, inside and outside tests.

**2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

##### UNIT III:

**2-D viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

**3-D object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.

##### UNIT IV:

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear Transformations, composite transformations, 3D Viewing pipeline, clipping, projections (Parallel and Perspective).



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#### UNIT V:

**Graphics Programming** Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Key frame - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes

#### UNIT VI:

Overview of Ray Tracing Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

#### TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education, 2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

#### REFERENCE BOOKS:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

#### WEB LINKS:

1. <https://www.intechopen.com/books/computer-graphics>
2. [https://www.tutorialspoint.com/computer\\_graphics/index.htm](https://www.tutorialspoint.com/computer_graphics/index.htm)
3. [www.cs.princeton.edu/courses/archive/spr02/cs217/lectures/graphics.pdf](http://www.cs.princeton.edu/courses/archive/spr02/cs217/lectures/graphics.pdf)
4. [www.inf.ed.ac.uk/teaching/courses/cg/Web/intro\\_graphics.pdf](http://www.inf.ed.ac.uk/teaching/courses/cg/Web/intro_graphics.pdf)



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### DEPARTMENT OF INFORMATION TECHNOLOGY



#### ELECTIVE-II

16IT7D07

#### I. IMAGE PROCESSING

##### COURSE OBJECTIVES:

- To introduce basic principles of digital image processing.
- To provide knowledge on Image data structures
- To demonstrate different image Compression techniques.
- To explain segmentation techniques.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Enumerate the fundamental steps in digital image processing.
CO2	List image enhancement techniques in spatial domain.
CO3	List image enhancement techniques in frequency domain.
CO4	Compare different types of color image processing techniques and its operations.
CO5	Analyze various image compression techniques.
CO6	Differentiate edge linking and boundary detection techniques.

##### UNIT I:

Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

##### UNIT II:

**Image enhancement in the spatial domain:** Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods.

##### UNIT III:

**Image enhancement in the frequency domain:** Introduction to the Fourier Transform and the frequency, Smoothing Frequency-domain Filters: Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian Lowpass Filters; Sharpening Frequency Domain Filters: Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters

##### UNIT IV:

Color Image Processing: Color fundamentals, color models, pseudo color image processing, basics of full-color image processing, color transforms, smoothing and sharpening, color segmentation.

##### UNIT V:

Image Compression: Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards.



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## UNIT VI:

**Morphological Image Processing:** Dilation and Erosion, Some Morphological Algorithms: Boundary Extraction, Region Filling, Convex Hull, Thinning and Thickening.

**Image Segmentation:** Detection of discontinuous, edge linking and boundary detection, thresholding, region-based segmentation.

## TEXT BOOKS:

1. Digital Image Processing, Rafeal C. Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.

## REFERENCE BOOKS:

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003
4. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
5. Digital Image Processing using Matlab, Rafeal C. Gonzalez, Richard E.Woods, Steven L.Eddins, Pearson Education.

## WEB LINKS:

1. <https://www.peterindia.net/ImageProcessing.html>
2. [http://www.imageprocessingplace.com/root\\_files\\_V3/image\\_databases.htm](http://www.imageprocessingplace.com/root_files_V3/image_databases.htm)
3. [https://www.tutorialspoint.com/dip/image\\_processing\\_introduction.htm](https://www.tutorialspoint.com/dip/image_processing_introduction.htm)





# PRAGATI ENGINEERING COLLEGE AUTONOMOUS DEPARTMENT OF INFORMATION TECHNOLOGY



16IT7D08

## II. HUMAN COMPUTER INTERACTION

### COURSE OBJECTIVES:

- The main objective is to get student to think constructively and analytically about how to design and evaluate interactive technologies.

### COURSE OUTCOMES:

The Student will be able to:	
CO1	List out the characteristics of Graphical and Web User Interface.
CO2	Analyze the impact of Human Interaction Speeds, Performance versus Preference in the User Interface Design.
CO3	Determine Business Functions.
CO4	Design User Interface Components like System Menu, Windows etc.
CO5	Select proper device and screen based controls.
CO6	Provide Proper Feedback, Guidance and Assistance for the User Interface Design.

### UNIT I:

**The User Interface:** Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface.

### UNIT II:

**The User Interface Design Process:** Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds.

### UNIT III:

**Understanding Business Functions:** Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation.

### UNIT IV:

**Principles of Good Screen Design:** Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows.



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#### UNIT V:

**Device and Screen-Based Control:** Device based controls, Operable Controls, Text entry/read- Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls.

#### UNIT VI:

**Effective Feedback Guidance and Assistance:** Providing the Proper Feedback, Guidance and Assistance Effective Internationalization and Accessibility- International consideration, Accessibility, Create meaningful Graphics, Icons and Images, Colors-uses, possible problems with colors, choosing colors.

#### TEXT BOOKS:

1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley India Edition
2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
3. Ben Shneidermann, "Designing the user interfaces". 3rd Edition, Pearson Education Asia.

#### REFERENCES BOOKS:

1. Soren Lauesen, "User Interface Design" , Pearson Education
2. Alan Cooper, Robert Riemann, David Cronin, "Essentials of Interaction Design", Wiley
3. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg, "HumanComputer Interaction", Pearson Education.

#### WEB LINKS:

1. [https://onlinecourses.nptel.ac.in/noc18\\_cs23/preview](https://onlinecourses.nptel.ac.in/noc18_cs23/preview)
2. <http://nptel.ac.in/courses/106103115/>
3. <https://www.interaction-design.org/courses/human-computer-interaction>



# PRAGATI ENGINEERING COLLEGE AUTONOMOUS

## DEPARTMENT OF INFORMATION TECHNOLOGY



16IT7D09

### III.MACHINE LEARNING

#### COURSE OBJECTIVES:

- To introduce machine learning problems corresponding to different applications.
- To learn concepts of Decision tree learning and artificial neural networks.
- To discuss Bayesian learning and computational learning theory.
- To provide basic Knowledge on Instance based learning.

#### COURSE OUTCOMES:

The Student will be able to:	
CO1	Illustrate Decision Theory.
CO2	Analyze Linear models for Regression
CO3	Analyze Linear models for Classification
CO4	Apply the concept of Feature Selection .
CO5	List the linear Transforms in Feature Generation I
CO6	Implement the Feature Generation II

#### UNIT I:

Decision Theory: Minimizing the misclassification rate, Minimizing the expected loss, The reject option, Inference and decision, Loss functions for regression.

Information Theory: Relative entropy and mutual information

#### UNIT II:

**Linear Models for Regression:** Linear Basis Function Models: Maximum likelihood and least squares, Geometry of least squares. The Bias-Variance Decomposition, Bayesian Linear Regression, Bayesian Model Comparison

#### UNIT III:

**Linear Models for Classification:** Discriminant Functions: Two classes, Multiple classes, Least squares for classification. Probabilistic Generative Models, Probabilistic Discriminative Model: Fixed basis functions, Logistic regression, Iterative reweighted least square

#### UNIT IV:

**Feature Selection:** Introduction, Preprocessing, Feature Selection Based on Statistical Hypothesis Testing, The Receiver Operating Characteristics CROC Curve, The Receiver Operating Characteristics CROC Curve, Class Separability Measures, Feature subset selection.



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#### UNIT V:

**Feature Generation I: Linear Transforms** Introduction, Basis Vectors and Images, The Karhunen-Lohe Transform, The Singular Value Decomposition, Independent Component Analysis, The Discrete Fourier Transform (DFT), The Discrete Cosine and Sine Transforms, The Hadamard Transform, The Haar Transform.

#### UNIT VI:

**Feature Generation II:** Introduction, Regional Features, Features for Shape and Size Characterization, A Glimpse at Fractals.

#### TEXT BOOK:

1. Pattern Recognition and Machine Learning, christopher bishop[1,2,3]
2. Pattern Recognition, Sergios Theodoridis & Konstantinos Koutroumbas, Second Edition.[4,5,6]

#### REFERENCE BOOKS:

1. Understanding Machine Learning from theory to algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.

#### WEB LINKS:

1. [www.site.uottawa.ca/~nat/Courses/CSI5387/ML\\_Lecture\\_9.ppt](http://www.site.uottawa.ca/~nat/Courses/CSI5387/ML_Lecture_9.ppt)
2. [http://artint.info/html/ArtInt\\_177.html](http://artint.info/html/ArtInt_177.html)
3. <http://fastml.com/bayesian-machine-learning/>
4. <https://link.springer.com/content/pdf/10.1023%2FA%3A1022689900470.pdf>
5. <http://ai.stanford.edu/people/nilsson/MLBOOK.pdf>



# PRAGATI ENGINEERING COLLEGE AUTONOMOUS DEPARTMENT OF INFORMATION TECHNOLOGY



16IT7D10

## IV. DECISION SUPPORT SYSTEM

### COURSE OBJECTIVES:

1. To understand the basic concepts of Decision making systems
2. To develop and learn various applications of Decision support system

### COURSE OUTCOMES:

The Student will be able to:	
CO1	Evaluate the benefits of Decision support systems
CO2	Analyze the factors that impart decision making.
CO3	Differentiate between information and information quality models.
CO4	Categorize different types of decision support system.
CO5	Analyze architectural aspects of decision support system.
CO6	Compare different types of models in Decision support systems.

### UNIT I:

Introduction to Decision Support Systems, How Decision Support Systems Evolved, What is a DSS? Why decision Support Systems Matter, DSS Benefits – Why Study DSS?

### UNIT II:

Human Decision –Making Processes what is a Decision? –The Decision Process, Types of Decision, How Business People make Decision, The Impact of culture on Decision Making.

### UNIT III:

Systems, Information Quality. And Models- About Systems- Information Systems Data Flow Diagrams – DSS as Information Systems- Information and Information Quality- Models.

### UNIT IV:

Types of Decision Support Systems – the DSS Hierarchy – Generalizing the DSS Categories – Matching DSS to the Decision Type.

### UNIT V:

DSS Architecture, Hardware and Operating Systems platform, defining the DSS Architecture-The Major Options- DSS on the Central Corporate System, DSS and Clint/Server Computing.

### UNIT VI:

DSS Software Tools, DSS Software Categories, Standard Packages, Programming Languages DSS, Models in Decision Support Systems.

### TEXT BOOKS:

1. Decision Support and Data Warehouse Systems, Efram G. Mallach Mc Graw Hill.
2. Decision Support Systems for Business Intelligence, Vicki L. Sauter



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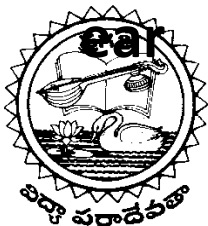


### REFERENCE BOOKS:

1. Decision Support Systems (2nd Edition) George M. Marakas, Prentice Hall

### WEB LINKS:

1. <https://www.informationbuilders.com/decision-support-systems-dss>
2. <http://nptel.ac.in/courses/105108081/39>
3. <http://nptel.ac.in/syllabus/110104021/>
4. <https://nptel.ac.in/courses/106108102/6>



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16IT7D11

#### V. ARTIFICIAL NEURAL NETWORKS

##### COURSE OBJECTIVES:

- To understand the role of artificial intelligence in engineering.
- To understand the differences between networks for supervised and unsupervised learning

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare different classes of network architectures.
CO2	Differentiate various learning mechanisms like Memory-based learning, Hebbian learning, Competitive learning.
CO3	Design a pattern classifier using a Single layer perceptron.
CO4	Analyze issues of back propagation learning in multi layer feed forward networks.
CO5	Analyze Radial Basis Function Networks.
CO6	Demonstrate Self Organizing Maps.

##### UNIT I:

**Introduction and ANN Structure:** Biological neurons and artificial neurons, Model of an ANN. Activation functions used in ANNs, Typical classes of network architectures.

##### UNIT II:

Mathematical Foundations and Learning mechanisms, Re-visiting vector and matrix algebra, State-space concepts, Concepts of optimization, Error-correction learning, Memory-based learning, Hebbian learning, Competitive learning.

##### UNIT III:

Single layer perceptrons. Structure and learning of perceptrons. Pattern classifier – introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

##### UNIT IV:

**Feed forward ANN:** Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation - training and convergence.

##### UNIT V:

**Radial Basis Function Networks:** Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks. RBF network design and training. Approximation properties of RBF.



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#### UNIT VI:

**Self Organizing Maps:** Introduction, Two basic Feature-Mapping Models, Self-Organizing Map, Summary of the SOM Algorithm, Properties of the Feature Map, Computer Simulations, Learning Vector Quantization.

#### TEXT BOOKS:

2. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
3. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

#### REFERENCE BOOKS:

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

#### WEBLINKS:

1. [https://en.wikibooks.org/wiki/Artificial\\_Neural\\_Networks](https://en.wikibooks.org/wiki/Artificial_Neural_Networks)
2. <http://www.dkriesel.com/media/science/neuronalenetze-en-zeta2-1col-dkrieselcom.pdf>





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16IT7D12

#### VI. E-COMMERCE

##### COURSE OBJECTIVES:

- This module is an introduction to the basic concepts of e-business and e-commerce, including presentation and discussion of the strategies and technologies involved.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare different types of E-Commerce Applications.
CO2	Differentiate between different Electronic Payment Systems.
CO3	Compare and contrast between Inter and Intra Organizational Commerce.
CO4	Perform online marketing process.
CO5	Perform information search and retrieval.
CO6	Analyze different multimedia concepts.

##### UNIT I:

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications, Consumer Oriented Electronic commerce - Mercantile Process models.

##### UNIT II:

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

##### UNIT III:

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.  
Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

##### UNIT IV:

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses.  
Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research.

##### UNIT V:

Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering.

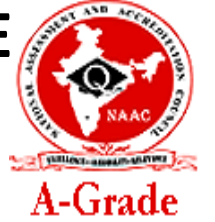
##### UNIT VI:

Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing.



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### TEXT BOOKS:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.
2. E-Commerce, strategy, Technology, and Implementation, Gary P. Schneider, 1<sup>st</sup> Ed, Cengage Learning.

### REFERENCES:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
4. Electronic Commerce – Gary P.Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

### WEB LINKS:

1. [https://onlinecourses.nptel.ac.in/noc17\\_mg22/preview](https://onlinecourses.nptel.ac.in/noc17_mg22/preview)
2. [http://nptel.ac.in/courses/106108103/pdf/Lecture\\_Notes/LNm13.pdf](http://nptel.ac.in/courses/106108103/pdf/Lecture_Notes/LNm13.pdf)
3. <http://nptel.ac.in/courses/110105083/>



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16IT7L10

#### MOBILE COMPUTING LAB

#### COURSE OUTCOMES:

The Student will be able to:

- Develop J2ME applications.
- Develop mobile applications using android.

#### LIST OF EXPERIMENTS:

1. Write a J2ME program to show how to change the font size and color.
2. Write a J2ME program which creates the following kind of menu.
  - cut
  - copy
  - past
  - delete
  - select all
  - unselect all
3. Create a J2ME menu which has the following options (Event Handling):
  - cut - can be on/off
  - copy - can be on/off
  - paste - can be on/off
  - delete - can be on/off
  - select all - put all 4 options on
  - unselect all - put all
4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.
5. Create an MIDP application which examines, that a phone number, which a user has entered is in the given format (Input checking):
  - Area code should be one of the following: 040, 041, 050, 0400, 044
  - There should 6-8 numbers in telephone number (+ area code)
6. Write an Android application program that displays Hello World using an IDE.
7. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using an IDE.
8. Write an Android application program that demonstrates the following:
  - (i) Linear Layout
  - (ii) Relative Layout
  - (iii) Table Layout



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## DEPARTMENT OF INFORMATION TECHNOLOGY



(iv) Grid View layout

9. Write an Android application program that converts the temperature in Celsius to Fahrenheit.
10. Write an Android application program that demonstrates intent in mobile application development.



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16IT7L11

#### OPEN SOURCE SOFTWARE LAB

#### COURSE OUTCOMES:

The Student will be able to:

- Build programs using angular JS.
- Create programs based on jquery.
- Implement programming with Ruby on Rails.
- Develop nosql programs using MongoDB and HBase.

#### LIST OF EXPERIMENTS:

1. Display "Hello World" message using Angular js
2. Write a Angular js Program for Controllers.
3. Write a Angular js Program for Expression, using a variable.
4. Display "Hello World" message using jQuery.
5. Write a JQuery to Change text color of the elements
6. Selecting elements by element name in jQuery
7. Display "Hello World" message using Ruby on Rails
8. Create A Demo App using Ruby on Rails
9. Do four basic operations, create, read, update, and delete (CRUD) Using Mongo shell
10. Manipulate and view data in the Mongo shell
11. Adding new documents to a collection Using MongoDB
12. Removing documents from a collection Using MongoDB
13. Updating existing documents Using MongoDB
14. Installation of Hbase
15. Application inserting data into HBase



# PRAGATI ENGINEERING COLLEGE

## AUTONOMOUS

### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8T18

#### CLOUD COMPUTING

##### COURSE OBJECTIVES:

- The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare system model for cloud computing.
CO2	Identify the levels of virtualization.
CO3	Differentiate various cloud platform architectures.
CO4	Classify about cloud software environments.
CO5	Outline about scheduling and resource management in cloud.
CO6	Compare different cloud storage systems.

##### UNIT I:

**Systems modeling, Clustering and virtualization:** Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

##### UNIT II:

**Virtual Machines and Virtualization of Clusters:** Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management.

##### UNIT III:

**Cloud Platform Architecture:** Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Services and Service Oriented Architecture, Message Oriented Middleware.

##### UNIT IV:

**Cloud Programming and Software Environments:** Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.



# PRAGATI ENGINEERING COLLEGE AUTONOMOUS

## DEPARTMENT OF INFORMATION TECHNOLOGY



### UNIT V:

**Cloud Resource Management and Scheduling:** Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds, Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines.

### UNIT VI:

**Storage Systems:** Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system, Apache Hadoop, BigTable, Megastore, Amazon Simple Storage Service (S3)

### TEXT BOOKS

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier. (Unit- 1 to 4)
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier. (Unit- 5 & 6)

### REFERENCE BOOK

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madiseti, University Press

### WEB LINKS:

1. [https://onlinecourses.nptel.ac.in/noc17\\_cs23/preview](https://onlinecourses.nptel.ac.in/noc17_cs23/preview)
2. <https://www.smartworld.com/notes/cloud-computing-complete-notes-pdf/>
3. [https://www.tutorialspoint.com/e\\_commerce/e\\_commerce\\_tutorial.pdf](https://www.tutorialspoint.com/e_commerce/e_commerce_tutorial.pdf)



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8T19

#### CYBER SECURITY

##### COURSE OBJECTIVES:

- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Realize the differences between Indian Perspective on Cyber Crimes and Global Perspective on Cyber Crimes.
CO2	Analyze how criminals plan attacks and the fuel for cybercrimes.
CO3	Identify different classes of attacks and frauds.
CO4	Enumerate the tools and methods used in Cybercrime.
CO5	Elaborate the legal implications of Cybercrimes and Cyber security.
CO6	Perform digital forensic analysis.

##### UNIT I: Introduction to Cybercrime:

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens.

##### UNIT II: Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

##### UNIT III: Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

##### UNIT IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).





# PRAGATI ENGINEERING COLLEGE AUTONOMOUS

DEPARTMENT OF INFORMATION TECHNOLOGY



## UNIT V: Cybercrimes and Cyber security:

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

## UNIT VI: Understanding Computer Forensics:

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics.

## TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
2. Principles of Information Security, Micheal E. Whitman and Herbert J. Mattord, Cengage Learning.

## REFERENCE BOOKS:

1. Information Security, Mark Rhodes, Ousley, MGH.

## WEB LINKS:

1. <https://www.dhs.gov/topic/cybersecurity>
2. <http://libguides.armstrong.edu/cyber>
3. <https://www.coursera.org/courses?languages=en&query=cybersecurity>
4. <http://fau.edu/security/links/>



# PRAGATI ENGINEERING COLLEGE AUTONOMOUS

DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8T20

## DATA WAREHOUSING AND BUSINESS INTELLIGENCE

### COURSE OBJECTIVES:

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and business intelligence.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.

### COURSE OUTCOMES:

The Student will be able to:	
CO1	Classify the Data Warehouse Design & concepts
CO2	Demonstrate Data Cube Technology
CO3	Classify about Business intelligence models.
CO4	Roll out various Data Provisioning.
CO5	Differentiate Data Description & Visualization
CO6	Analyze the process stages in BI

### UNIT I:

**Data Warehousing and Online Analytical Processing:** Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction.

**UNIT II: Data Cube Technology:** Data Cube Computation: Preliminary Concepts, Data Cube Computation Methods, Processing Advanced Kinds of Queries by Exploring Cube Technology,

### UNIT III:

**Modeling in Business Intelligence:** Models and Modeling in Business Intelligence, Logical and Algebraic Structures, Graph Structures, Analytical Structures, Models and Data, Multidimensional Data Analysis in Cube Space,

### UNIT IV:

**Data Provisioning:** Introduction and Goals, Data Collection and Description, Data Extraction, From Transactional Data Towards Analytical Data, Schema and Data Integration, Conclusion and Lessons Learned.

### UNIT V:

**Data Description and Visualization:** Introduction, Description and Visualization of Business Processes, Description and Visualization of Data in the Customer, Basic Visualization Techniques, Reporting.



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DEPARTMENT OF INFORMATION TECHNOLOGY



## UNIT VI:

**Process Analysis:** Introduction and Terminology, Business Process Analysis and Simulation, Process Performance Management and Warehousing, Process Mining, Business Process Compliance, Evaluation and Assessment.

## TEXT BOOKS:

1. Data Mining Concepts and Techniques Third Edition Jiawei Han University of Illinois at Urbana–Champaign Micheline Kamber Jian Pei Simon Fraser Universit. (Unit-I,II)
2. Fundamentals of Business Intelligence grossmann, Wilfried, rinderle-ma, Stefanie(Unit-III,IV,V,VI)

## REFERENCE BOOKS:

1. Paulraj Punniyah: Data Warehousing Fundamentals: A comprehensive guide for IT , John Wiley publications, 2001.
2. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009

## WEB LINKS:

1. <http://nptel.ac.in/courses/110106064/>
2. <http://nptel.ac.in/courses/110107092/>
3. <http://nptel.ac.in/courses/110104086/>
4. <http://datawarehouse4u.info/What-is-Business-Intelligence.html>



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



#### ELECTIVE-III

16IT8D13

#### I. AGILE METHODOLOGIES

##### COURSE OBJECTIVES:

- Know about software and its development
- Gain knowledge in agile development
- Study the agile methods
- Student will know about lifecycle of agile methods
- Student will have an appreciation of the necessity and difficulty in case study.
- Student will know about Agile Practice And Testing

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	List out various software development techniques.
CO2	Outline about Agile method and its tools.
CO3	Identify software motivation techniques.
CO4	Classify about need of Evidence in agile.
CO5	Implement Scrum model.
CO6	Design and test project using agile methodology.

##### UNIT I:

**Introduction:** Software Is New Product Development, Web Resources.

**Iterative Evolutionary:** Iterative Development, Risk-Driven and Client-Driven Iterative Planning, Time boxed Iterative Development, Evolutionary and Adaptive Development, Evolutionary Requirements Analysis, Evolutionary and Adaptive Planning, Incremental Delivery, Evolutionary Delivery, The Most Common Mistake, Specific Iterative Evolutionary Methods.

##### UNIT II:

**Agile:** Agile Development, Classification of Methods, the Agile Manifesto and Principles, Agile Project Management, Embrace Communication and Feedback, Empirical vs. Defined & Prescriptive Process, Principle-Based versus Rule-Based, Sustainable Discipline: The Human Touch, Team as a Complex Adaptive System, Agile Hype.

##### UNIT III:

**Motivation:** The Facts of Change on Software Projects, Key Motivations for Iterative Development, Meeting the Requirements Challenge Iteratively, Problems with the Waterfall.



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#### UNIT IV:

**Evidence:** Research Evidence, Early Historical Project Evidence, Standards-Body Evidence, Expert and Thought Leader Evidence, A Business Case for Iterative Development, The Historical Accident of Waterfall Validity.

#### UNIT V:

**Scrum:** Method Overview: Lifecycle, Work products, Roles, and Practices, Values, Common Mistakes and Misunderstandings, Sample Projects, Process Mixtures, Adoption Strategies, Fact versus Fantasy, Strengths versus Other, History.

#### UNIT VI:

**Agile Practicing and Testing:** Project management – Environment – Requirements – Test – The agile alliances –The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams.

#### TEXT BOOKS:

1. Craig Larman, “Agile and Iterative Development – A Manager’s Guide”, Pearson Education – 2004.
2. Elisabeth Hendrickson Quality Tree Software Inc, “*Agile Testing*” 2008.

#### REFERENCES:

1. Agile Software Development – Wikipedia.
2. Alistair “Agile Software Development series” Cockburn - 2001.

#### WEBLINKS:

1. [www.agileintro.wordpress.com/2008](http://www.agileintro.wordpress.com/2008)
2. <http://nptel.ac.in/courses/106101061/26>
3. <https://www.versionone.com/agile-101/agile-methodologies/>
4. <https://www.codeproject.com/Articles/604417/Agile-software-development-methodologies-and-how-to>
5. <https://www.coursera.org/learn/agile-software-development>
6. <https://www.smartsheet.com/understanding-agile-software-development-lifecycle-and-process-workflow>



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8D14

## II. INTERNET OF THINGS

### COURSE OBJECTIVES:

- To assess the vision and introduction of IoT.
- To Understand IoT Market perspective.
- To Implement Data and Knowledge Management and use of Devices in IoT Technology.

### COURSE OUTCOMES:

The Student will be able to:	
CO1	Describe about IoT Design, deployment templates in which domain it is useful.
CO2	Explain different network management techniques and protocols used for managing IoT systems with NETCONF, YANG, NETOPEER
CO3	Design IoT based applications by using PYTHON packages
CO4	Formulate IoT applications that uses Raspberry Pi
CO5	Illustrate IoT Design in the form of a case study
CO6	Build a data analytic system for IoT

### UNIT I:

Introduction to Internet of Things, Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates  
Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle.

### UNIT II:

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, 1 Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

### UNIT III:

IoT Platforms Design Methodology IoT Design Methodology, Case Study on IoT System for Weather Monitoring , Motivation for Using Python , IoT Systems - Logical Design using Python , Packages , Date/Time Operations , Python Packages of Interest for IoT.

### UNIT IV:

IoT Physical Devices & Endpoints, Raspberry Pi , About the Board , Linux on Raspberry Pi , Raspberry Pi Interfaces , Programming Raspberry Pi with Python , Other IoT Devices, IoT Physical Servers & Cloud Offerings , Introduction to Cloud Storage Models & Communication APIs , WAMP - Autobahn for IoT , Xively Cloud for IoT , Python Web Application Framework - Django



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### DEPARTMENT OF INFORMATION TECHNOLOGY



#### UNIT V:

Case Studies Illustrating IoT Design, Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.

#### UNIT VI:

Data Analytics for IoT , Introduction , Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis , Apache Oozie , Apache Spark , Apache Storm , Using Apache Storm for Real time Data Analysis , Structural Health Monitoring Case Study , Tools for IOT.

#### TEXT BOOKS:

1. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

#### REFERNCE BOOKS:

1. Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012.

#### WEB LINKS:

1. [https://onlinecourses.nptel.ac.in/noc17\\_cs22/preview](https://onlinecourses.nptel.ac.in/noc17_cs22/preview)
2. <http://nptel.ac.in/courses/106105166/>
3. [https://onlinecourses.nptel.ac.in/noc18\\_cs08/preview](https://onlinecourses.nptel.ac.in/noc18_cs08/preview)
4. [https://onlinecourses.nptel.ac.in/noc17\\_ee20/preview](https://onlinecourses.nptel.ac.in/noc17_ee20/preview)



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8D15

### III. COMPUTER VISION

#### COURSE OBJECTIVES:

- The fundamentals of Computer Graphics and Image Processing
- The concepts related edge detection, segmentation, morphology and image compression methods.

#### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare different image formation methods.
CO2	Elaborate various image processing transformations.
CO3	Perform feature detection and matching.
CO4	Implement image segmentation.
CO5	Compare 2-D and 3-D feature based alignment.
CO6	Explain about Two-frame structure from motion.

#### UNIT I:

**Introduction:** computer vision, A brief history, Book overview, Sample syllabus, Notation

**Image formation:** Geometric primitives and transformations, Photometric image formation, The digital camera.

#### UNIT II:

**Image processing:** Point operators, Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization.

#### UNIT III:

**Feature detection and matching:** Points and patches, Edges, Lines

#### UNIT IV:

**Segmentation:** Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods.

#### UNIT V:

**Feature-based alignment:** 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration.

#### UNIT VI:

**Structure from motion:** Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, constrained structure and motion.





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## DEPARTMENT OF INFORMATION TECHNOLOGY



### TEXT BOOKS:

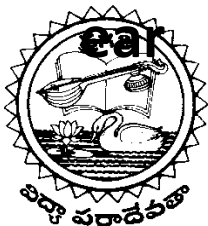
1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011.

### REFERENCE BOOKS:

1. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003.
2. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
3. K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990.

### WEB LINKS:

1. [https://onlinecourses.nptel.ac.in/noc18\\_ee08/preview](https://onlinecourses.nptel.ac.in/noc18_ee08/preview)
2. <http://nptel.ac.in/courses/106105032/>
3. <http://nptel.ac.in/courses/112101098/25>
4. <http://www.cse.iitd.ernet.in/~suban/vision/index.html>



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8D16

#### IV. MULTIMEDIA PROGRAMMING

##### COURSE OBJECTIVES:

- To provide the foundation knowledge of multimedia computing, e.g. media characteristics, compression standards, multimedia representation, data formats, multimedia technology development.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Illustrate the characteristics of Text, Images, Audio and Video (Multimedia Information Representations).
CO2	Differentiate between Lossy and Lossless Compression techniques.
CO3	Compare and Contrast GIF, TIFF and JPEG Image Compression Techniques
CO4	Compare and Contrast DPCM, ADPCM, MPEG Audio Compression Techniques.
CO5	Enumerate Basic video Compression Techniques.
CO6	Design Interactive Applications over the Internet.

##### UNIT I:

###### Multimedia Information Representation:

Introduction, Digitization Principles – Analog Signals, Encoder Design, Decoder Design. Text – Unformatted Text, Formatted Text, Hyper Text. Images- Graphics, Digitized Documents, Digitized Pictures. Audio – PCM Speech, CD – Quality Audio, Synthesized Audio. Video –Broadcast Television, Digital Video, PC Video, Video Content.

##### UNIT II:

###### Text Compression:

Compression Principles – Source Encoder and Destination Decoder, Lossless and Lossy Compression, Entropy Encoding, Source Encoding. Text Compression – Static and Dynamic Huffman Coding, Arithmetic Coding.

##### UNIT III:

###### Image Compression:

Graphics Interchange Format (GIF), Tagged Image File Format (TIFF), Digitized Documents, JPEG.

##### UNIT IV:

###### Audio Compression:

Differential Pulse Coded Modulation (DPCM), Adaptive Differential PCM (ADPCM), Adaptive Predictive Coding and Linear Predictive Coding, MPEG Audio Coding.



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#### UNIT V:

##### **Video Compression:**

Principles, H.261 Video Compression, MPEG 1, MPEG 2 and MPEG 4.

#### UNIT VI:

##### **Multimedia Applications:**

Inter- personnel Communication, Interactive Applications over the Internet, Entertainment Applications and Multimedia Conferencing.

#### **TEXT BOOKS:**

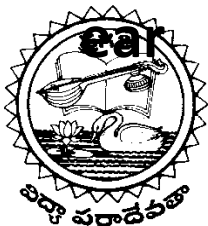
1. Halshall, Fred. "Multimedia Communications – Applications, Networks, Protocols and Standards". 2001. Pearson Education.

#### **REFERENCE BOOKS:**

1. Chapman, Nigel and Chapman, Jenny. "Digital Multimedia". 2000. John Wily & Sons.
2. Steinmaetz, Ralf and Nahrstedt, Klara. Multimedia: "Communications and Applications" 2003. Pearson Education.

#### **WEB LINKS:**

1. [www.lit.ie/Courses/LC234](http://www.lit.ie/Courses/LC234)
2. <https://www.youtube.com/watch?v=U7Iso9GW158>
3. [http://www.bmcc.cuny.edu/media-arts/mmp\\_program.jsp](http://www.bmcc.cuny.edu/media-arts/mmp_program.jsp)
4. [https://www.youtube.com/watch?v=s\\_EQcpN00mg](https://www.youtube.com/watch?v=s_EQcpN00mg)



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8D17

#### V. SOCIAL NETWORKING & SEMANTIC WEB

##### COURSE OBJECTIVES:

- To explain the analysis of the social Web and the design of a new class of applications that combine human intelligence with machine processing.
- To describe how the Semantic Web provides the key in aggregating information across heterogeneous sources.
- To understand the benefits of Semantic Web by incorporating user-generated metadata and other clues left behind by users.

##### COURSE OUTCOMES:

The Student will be able to:	
CO1	Enumerate the measures of social network analysis.
CO2	Illustrate Electronic sources for network analysis and different Ontology languages
CO3	Model and aggregate social network data
CO4	Develop social-semantic applications
CO5	Evaluate Web- based social network
CO6	Demonstrate model of ontologies

##### UNIT I:

**Introduction to the Semantic Web and Social Networks:** The Semantic Web- Limitations of the current Web, The semantic solution, Development of the Semantic Web, The emergence of the social web. Social Network Analysis- What is network analysis, Development of Social Network Analysis, Key concepts and measures in network analysis.

##### UNIT II:

**Web data, Semantics and Knowledge Representation on the Semantic Web:** Electronic sources for network analysis- Electronic discussion networks, Blogs and online communities, Web-based networks. Knowledge Representation on the Semantic Web - Ontologies and their role in the Semantic Web, Ontology languages for the Semantic Web (RDF, OWL).

##### UNIT III:

**Modeling and aggregating social network data:** State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data.

##### UNIT IV:

**Developing social-semantic applications:** Building Semantic Web applications with social network features, Flink: the social networks of the Semantic Web community, open academia: distributed, semantic-based publication management.



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#### UNIT V:

**Evaluation of web-based social network extraction:** Differences between survey methods and electronic data extraction, Context of the empirical study, Data collection, Preparing the data, Optimizing goodness of fit, Comparison across methods and networks, Predicting the goodness of fit, Evaluation through analysis.

#### UNIT VI:

**Ontologies are us: emergent semantics in folksonomy systems:** A tripartite model of ontologies, Case studies, Evaluation

#### TEXT BOOK:

1. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

#### REFERENCE BOOKS:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Information sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly, SPD.

#### WEB LINKS:

1. <https://link.springer.com/content/pdf/10.1007%2F978-0-387-71001-3.pdf>
2. [www.springer.com/in/book/9780387710006](http://www.springer.com/in/book/9780387710006)
3. [https://en.wikipedia.org/wiki/Social\\_Semantic\\_Web](https://en.wikipedia.org/wiki/Social_Semantic_Web)



# PRAGATI ENGINEERING COLLEGE

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### DEPARTMENT OF INFORMATION TECHNOLOGY



16IT8D18

## VI. CONCURRENT & PARALLEL PROGRAMMING

### COURSE OBJECTIVES:

- To study fundamental concepts of concurrency: non-determinism, race conditions, atomicity, synchronization, safety, liveness, fairness, deadlock
- To learn multithreaded programming using Java threads, Java concurrency constructs, Intel Threading Blocks, OpenMPI
- To know message passing model and programming with MPI
- To learn basic parallel algorithm design 5. To teach performance analysis of parallel program

### COURSE OUTCOMES:

The Student will be able to:	
CO1	Compare parallel programs and sequential programs.
CO2	Classify parallel computing platforms.
CO3	List the parallel algorithm models.
CO4	Write shared memory parallel programs with openMP.
CO5	Develop distributed memory parallel programs using MPI.
CO6	Design the parallel algorithm for Matrix and Graph related problems.

### UNIT I

Why Parallel Computing

Why We Need Ever-Increasing Performance, Why We're Building Parallel Systems, Why We Need to Write Parallel Programs, How Do We Write Parallel Programs, and Concurrent Vs Parallel Vs Distributed Computing.

### UNIT II

Parallel Programming Platforms

Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines; GPGPU.

### UNIT III

Principles of Parallel Algorithm Design

Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Parallel Algorithm Models.



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#### UNIT IV

Shared-Memory Programming with OpenMP

Getting Started, The Trapezoidal Rule, Scope of Variables, The Reduction Clause, The parallel for Directive, More about Loops in OpenMP: Sorting, Scheduling Loops, Producers and Consumers

#### UNIT V

Distributed-Memory Programming with MPI

Getting started, the Trapezoidal Rule in MPI, Dealing with I/O, Collective Communication, MPI Derived Data types, Performance Evaluation of MPI Programs

#### UNIT VI

Dense Matrix and Graph Algorithms

Matrix-Vector Multiplication, Matrix-Matrix Multiplication, Solving a System of Linear Equations, Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm

#### TEXT BOOKS:

1. An Introduction to Parallel Programming, Peter S. Pacheco, University of San Francisco, Morgan Kaufmann, Publishers (Units 1,4 & 5)
2. Introduction to Parallel Computing, Second Edition By Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Addison Wesley (Units 2,3 & 6)

#### REFERENCE BOOKS:

1. Parallel Programming in C with MPI and OpenMP by M J Quinn
2. Programming Massively Parallel Processors by D.Kirk and W. Hwu

#### WEB LINKS:

1. [http://nptel.ac.in/syllabus/syllabus\\_pdf/106102114.pdf](http://nptel.ac.in/syllabus/syllabus_pdf/106102114.pdf)
2. <http://nptel.ac.in/courses/106102114/23>
3. <http://nptel.ac.in/courses/106102163/>