

Integral University
STUDY & EVALUATION SCHEME
B.Tech Information Technology

Year 4th, Semester VII

S. No	Course Code	Subject	Periods			Evaluation Scheme				Subject Total
			L	T	P	Sessional Exam			Exam ESE	
						CT	TA	Total		
Theory Subjects										
1.	ICS-701	Artificial Intelligence	3	1	0	30	20	50	100	150
2.	ICS-702	Digital Image Processing	3	1	0	30	20	50	100	150
3.	ICS-703	Cryptography and Network Security	3	1	0	30	20	50	100	150
4.	ICS-704	Distributed Systems	3	1	0	30	20	50	100	150
5.		Elective 2	2	1	0	15	10	25	75	100
6.		Open Elective	3	1	0	30	20	50	100	150
Practicals /Training/Project										
7.	ICS-751	Artificial Intelligence Lab	0	0	3	10	10	20	30	50
8.	ICS-752	DIP lab using MATLAB	0	0	3	10	10	20	30	50
9.	ICS-753	Colloquium	0	0	3	-	-	50	-	50
10.	ICS-754	Project	0	0	3	-	-	50	-	50
11.	IGP-701	General Proficiency						50	-	50
Total			17	06	12	185	130	465	635	1100

Integral University
STUDY & EVALUATION SCHEME
B.Tech Information Technology

List of Electives

Elective-2

1. Software Testing & Reliability (IIT-021)
2. Computer Architecture (ICS-605)
3. ERP (IIT-022)

Open Electives

Offered by C.S.E. Branch:-

1. E-Commerce IIT-601

ARTIFICIAL INTELLIGENCE

ICS-701

w.e.f. Session 2015-16

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SUBJECT OBJECTIVES:

A student completing this course will be able to:

1. Explain the basic problem solving techniques, knowledge representation methods and learning methods of Artificial Intelligence.
2. Assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular engineering problems.
3. Understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering.
4. Develop intelligent systems by assembling solutions to concrete computational problems.
5. Develop an interest in the field sufficient to take more advanced subjects.

UNIT 1

INTRODUCTION: Introduction to AI, Current Trends in AI, Intelligent Agents:- **Agents and Environments**, Nature of Environments, Structure of Agents, Problem Solving, Problem Solving Agents, Example Problems, Searching for Solutions, **Uniformed Search Strategies** (BFS, DFS, DLS, IDS) [8]

UNIT 2

SEARCHING TECHNIQUES: Informed (Heuristic) Search Strategies: - Heuristic Function, Greedy best first search, A* search, Local Search Algorithms and Optimization Problems (Hill Climbing & Genetic Algorithm), **Introduction to Constraint Satisfaction Problems (CSP), Adversarial Search:-** Optimal Decisions in Games (MiniMax algorithm), Alpha – Beta Pruning. [9]

UNIT 3

KNOWLEDGE AND REASONING: Introduction to logical Agents, **Propositional Logic:-** Representation, Syntax and Semantics, Forward Chaining, Backward Chaining, CNF, Resolution, **First Order Logic:-** Representation, Syntax and Semantics, Inference in First Order Logic:- Unification, Forward Chaining, Backward Chaining, Resolution.

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UNIT 4

LEARNING: Forms of Learning, **Inductive Learning:-** Learning Decision Trees, **Statistical learning methods:-** Naïve bayes models, Bayesian network, EM algorithm, HMM, **Instance based learning:-**nearest neighbor models [10]

UNIT 5

INTELLIGENT SYSTEMS: Expert System- Stages in the Development of an Expert System, Difficulties in Developing Expert System, Application of Expert System, Introduction to **Evolutionary Programming, Swarm Intelligent Systems, Introduction to PROLOG.** [7]

REFERENCES:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.\
2. George F. Luger, “Artificial Intelligence-Structures and Strategies for Complex Problem Solving”, Pearson Education / PHI, 2002.
3. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
4. N.P. Padhy, “Artificial Intelligence and Intelligence systems”, Oxford Press.

DIGITAL IMAGE PROCESSING

(ICS-702)

w.e.f. Session 2015-16

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UNIT-I

Introduction and Fundamentals

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Spatial Domain

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-II

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, Highpass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

Image Restoration

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-III

Color Image Processing

Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

Morphological Image Processing

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening.

UNIT-IV

Registration

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth Segmentation Introduction, Region Extraction, Pixel- Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection:

Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

UNIT-V

Feature Extraction

Representation, Topological Attributes, Geometric Attributes. Description Boundary-based Description, Regionbased Description, Relationship.

Object Recognition

Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalez and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

CRYPTOGRAPHY AND NETWORK SECURITY

ICS-703

w.e.f. Session 2015-16

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UNIT 1

Introduction to OSI Security Architecture: Security Attacks, Services and Mechanisms, Introduction to Cryptology. Conventional Encryption: Conventional Encryption Model, Classical Encryption Techniques – Substitution Ciphers: Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One-Time Pad; Transpositions Ciphers: Rail Fence Technique; Rotor Machines, Cryptanalysis, Staganography; Modern Block Ciphers- Block Ciphers Principles: Stream & Block Ciphers, Fiestal Cipher, Shannon's Theory of Confusion and Diffusion, Data Encryption Standards (DES): DES Encryption and Decryption, Strength of DES, Differential & Linear Cryptanalysis of DES, Block Cipher Modes of Operation: ECB, CBC, CFB, OFB, CTR.

UNIT 2

Triple DES: Double DES, TDES with Two Keys, TDES with Three Keys; IDEA Encryption & Decryption, Strength of IDEA. Confidentiality Using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation: Use of Random Numbers, Pseudo Random Number Generators, Cryptographically Generated Random Numbers, Blum Blum Shub Generator. Introduction to Graph, Ring and Field, Prime and Relative Prime Numbers, Modular Arithmetic, Fermat's & Euler's Theorem, Primality Testing, Euclid's Algorithm.

UNIT 3

Principles of Public Key Cryptosystems: Introduction, Application & Requirement; RSA Algorithm: Computational Aspects, Security of RSA; Key Management, Diffie-Heilman Key Exchange Algorithm, Introductory Idea of Elliptic Curve Cryptography. Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions: Requirement for a Hash Function, Simple Hash Functions, Birthday Attacks, Block Chaining Techniques; Security of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA-1).

UNIT 4

Digital Signatures: Requirements, Direct & Arbitrated Digital Signature; Authentication Protocols: Mutual & One way Authentication; Digital Signature Standard (DSS): DSS Approach, Digital Signature Algorithm. Network Security Application- Authentication Applications: Kerberos Version 4 & Difference between Kerberos v4 & v5, Kerberos Realms; X.509 Authentication Service: Authentication Procedures, Directory Authentication Service; Electronic Mail Security – Pretty Good Privacy (PGP): Operational Description, Cryptographic Keys, Key Rings, Public Key Management; S /MIME.

UNIT 5

IP Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management; Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (SET); System Security: Intruders, Viruses and Related Threats: Malicious Programs, The Nature of Viruses, Types of Viruses, Macro Viruses, Email Viruses; Firewall: Firewall Design Principles, Trusted Systems.

REFERENCES:

1. William Stallings, "Cryptography and Network Security: Principles and Practice" Prentice Hall, New Jersey.
2. Johannes. A. Buchmann, "Introduction to cryptography", Springer Verlag. Bruce Schiener, "Applied Cryptography".

DISTRIBUTED SYSTEMS

ICS-704

w.e.f. Session 2015-16

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UNIT 1

CHARACTERIZATION OF DISTRIBUTED SYSTEMS: Introduction: Examples of Distributed Systems, Resource Sharing and the Web Challenges. System Models Architectural Models, Fundamental Models, Theoretical Foundation for Distributed System: Limitation of Distributed System, Absence of Global Clock, Shared Memory, Logical Clocks, Lamports & Vectors Logical Clocks, Causal Ordering of Messages, Global State, Termination Detection. Distributed Mutual Exclusion: Classification of Distributed Mutual Exclusion, Requirement of Mutual Exclusion Theorem, Token Based and Non Token Based Algorithms, Performance Metric for Distributed Mutual Exclusion Algorithms.

UNIT 2

DISTRIBUTED DEADLOCK DETECTION: System Model, Resource vs Communication Deadlocks, Deadlock Prevention, Avoidance, Detection & Resolution, Centralized Dead Lock Detection, Distributed Dead Lock Detection, Path Pushing Algorithms, Edge Chasing Algorithms. Agreement Protocols: Introduction, System Models, Classification of Agreement Problem, Byzantine Agreement Problem, Consensus Problem, Interactive Consistency Problem, Solution to Byzantine Agreement Problem, Application of Agreement Problem, Atomic Commit in Distributed Database System.

UNIT 3

DISTRIBUTED OBJECTS AND REMOTE INVOCATION: Communication Between Distributed Objects, Remote Procedure Call, Events and Notifications, Security:- Overview of Security Techniques, Cryptographic Algorithms, Cryptography Pragmatics, Needham Schroeder, Kerberos, SSL & Millicent, Replication: System Model and Group Communication, Fault – Tolerant Services, Highly Available Services, Transactions with Replicated Data.

UNIT 4

TRANSACTIONS AND CONCURRENCY CONTROL: Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control. Distributed Transactions: Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery, Distributed File Systems: File Service Architecture, Sun Network File System, The Andrew File System, Recent Advances.

UNIT 5

Distributed Shared Memory (DSM): Architecture, Algorithms for implementing DSM, Client- Server Algorithm, Migration Algorithm, Read Replication Algorithm, Full Replication Algorithm.

Distributed Multimedia Systems: Introduction, Characteristics of Multimedia data, Quality of service management, Resource management, Stream Adaption.

Case Study: CORBA RMI, CORBA Services, Java RMI.

REFERENCES:

1. Coulouris, Dollimore, Kindberg, " Distributed systems: Concepts and Design". Pearson Education Asia, 3ed.
2. Singhal and Shivratri, " Advanced Concepts in Operating Systems", Mc Graw Hill.

SOFTWARE TESTING AND RELIABILITY

(IIT-021)

w.e.f. Session 2015-16

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UNIT 1: Basics of Software Testing

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Humans, Errors and Testing, Software Quality; Requirements, Behavior and Correctness, Correctness Vs Reliability; Testing and Debugging; Test Metrics; Software and Hardware Testing; Testing and Verification; Defect Management; Execution History; Test Generation Strategies; Static Testing; Test Generation from Predicates.

UNIT 2: Testing strategies and types

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White box testing techniques: _ Statement coverage _ Branch Coverage _ Condition coverage Decision/Condition coverage Multiple condition coverage Dataflow coverage _ Automated code coverage analysis _ Inspections Walkthroughs Code Review Black box testing techniques: _ Boundary value analysis Robustness testing _ Equivalence Partitioning _ Syntax testing _ Finite state testing _ Levels of testing _ Unit, Integration and System Testing Compatibility Testing Domain Testing Adhoc Testing Use of Requirements Traceability Matrix Integration Testing Waterfall: Top-down Bottom up Big bang Sandwich System and Performance Testing : Types of system testing Functional and non - functional testing Acceptance Testing Setting entry and exit criteria for phases and typical product release scenarios Basic factors governing performance testing Methodology for performance testing _ Tools for performance testing Regression Testing: Purpose Timing Choice of tests Smoke tests _ Best practices Internationalization and Localization testing : Preliminary concepts Adhoc testing Pair testing Extreme testing Agile testing _ Exploratory testing Defect seeding Usability Testing :Factors in usability testing Aesthetics testing _ Accessibility testing Tools for usability testing

UNIT3: Test Management

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People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments –Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT 4: Software Reliability

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What Is Reliability, Fault and Failure, Time, Time Interval between Failures, Counting Failures in Periodic Intervals, Failure Intensity, Definitions of Software Reliability, First Definition of Software Reliability, Second Definition of Software Reliability, Comparing the Definitions of Software Reliability, Factors Influencing Software Reliability, Applications of Software Reliability, Comparison of Software Engineering Technologies, Measuring the Progress of System Testing, Controlling the System in Operation, Better Insight into Software Development Process, Operational Profiles, Operation, Representation of Operational Profile, Reliability Models

Text Books and References:

1. Software Testing – Principles and Practices; Srinivasan Desikan and Gopaldaswamy Ramesh.
2. Aditya P.Mathur, “Foundations of Software Testing”, Pearson Education,2008.
3. Software testing and quality assurance: theory and practice- KSHIRASAGAR NAIK, PRIYADARSHI TRIPATHY
4. Integrated Approach to Software Engineering (3e); Pankaj Jalote, Narosa Edition.

COMPUTER ARCHITECTURE

ICS-605

w.e.f. Session 2015-16

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UNIT 1

Introduction to Computer Architecture, Introduction to Parallel Computing, Need for Parallel Computing, Parallel Architectural Classification Schemes: Flynn's, Shores, Fengs Classification; Performance of Parallel Processors. Amdahl Law. Principles of Scalable Performance: Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches. [8]

UNIT 2

Processors and Memory Hierarchy: Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology; Bus, Cache, and Shared Memory: Backplane Bus Systems, Cache Memory Organizations, Cache Coherence and Synchronization Mechanisms, Shared-Memory Organizations. [7]

UNIT 3

Pipeline Processing: Introduction to Pipeline Processing, Arithmetic Pipelines, Steady State Analysis of Pipeline, Pipelined Instruction Processing, Interlocks, Hazards, and Hazards Detentions & Resolution Memory Systems used in Pipelines, Scheduling of Dynamic Pipelines. Superscalar and Superpipeline Design. [8]

UNIT 4

Parallel and Scalable Architectures, Multiprocessors and Multicomputer Multiprocessor System Interconnects, , Multivector and SIMD Computers, Vector Processing Principles, SIMD Parallel Processors, SIMD Computer Organizations, Scalable and Multithreaded Architectures, Interconnection Network: [9]

REFERENCES

1. Peterson & Heresy, "Quantitative approach to computer Architecture",
2. Kai Hwang, "Advanced Computer Architecture", McGraw Hill International.
3. "Morgan Kaufman". Quin, "Parallel computing, Theory & Practices", McGraw Hill
4. Bhujde, "Parallel Computing", New Age International Hwang, "Advance Computer Architecture",

ERP
IIT 022
w.e.f. Session 2015-16

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UNIT 1 [8]
Introduction to ERP: Evolution of ERP, Reasons for the growth of ERP, Scenario and Justification of ERP in India, Evaluation of ERP, Various modules of ERP, Advantages of ERP, An Overview of Enterprise: Integrated Management Information, Business Modeling, ERP for Small Business.

UNIT 2 [8]
ERP Implementation Lifecycle: Issues in Implementing ERP packages, Preevaluation, Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation, Team Training.

UNIT 3 [8]
ERP Market Introduction: Testing End- User Training Vendors, Consultants and Users: In-House Implementation -Pros and Cons, Vendors, Consultants, End- Users Software Associations (SSA), QAD, A Comparative Assessment and Selection of ERP Packages and Modules.

UNIT 4 [8]
ERP Trends : New Markets, New Channels, Faster Implementation Methodologies, Business Models and BAPIs, Convergence on Windows NT, Application Platforms, New Business Segments, More Features, Web Enabling, Market Snapshot.

REFERENCES:

1. Enterprise Resource Planning, Alex Leon, Tata McGraw Hill.
2. ERP - A Managerial Perspective, S.Sadagopan , Tata McGraw Hill.

E-COMMERCE
IIT-601
w.e.f. Session 2015-16

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Unit 1:

Introduction: Electronic Commerce - Technology and Prospects, Definition of E-Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-commerce on business.

Network Infrastructure for E- Commerce: Internet and Intranet based E-commerce-Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). [9]

Unit 2:

Mobile Commerce: Mobile Commerce: Introduction to Mobile Commerce, Mobile Computing Application, Wireless Application Protocols, WAP Technology, Mobile Information Devices. Virtual Private Network (VPN) , M commerce VS E commerce, M commerce payment methods and issues, M Commerce limitations. [8]

Unit 3:

Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls. [8]

Unit 4:

Net Commerce: EDI, EDI Application in Business, Legal & ethical Issues in E-Commerce, Identification and tracking tools of E Commerce, web based marketing, digital signatures and authentications ,Some sites of interests, E Commerce in India. [7]

Unit 5:

Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking, Home banking. E- Commerce Law, Forms of Agreement, Govt. policies and Agenda. [8]

REFERENCES:

1. Greenstein and Feinman "E-Commerce" TMH
2. Ravi Kalakota, Andrew Whinston "Frontiers of Electronic Commerce" Addison Wesley
2. Denial Amor "The F-Business Revolution"
3. Addison Wesley Sokol "From EDI to E-Commerce : A Business Initiative" TMH
- DIWAN, Sharma "E-Commerce" Excel Asset International "Net Commerce" TMH
4. Bajaj and Nag "E-Commerce: The Cutting Edge Business" TMH.

ARTIFICIAL INTELLIGENCE LAB
ICS-751
w.e.f. Session 2015-16

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Implement the programs based on the following topics in C/C++/Java/Lisp/Prolog.

1. Tower of Hanoi.
2. Uninformed Searches- Breadth First Search.
3. Depth first Search.
4. Iterative Deepening Search.
5. Depth Limited Search.
6. Informed Search- A* Algorithm.
7. Tic Tac Toe Problem.
8. 8 Puzzle Problem.
9. Hill Climbing.
10. Learning through Decision Trees.
11. Learning through Neural Networks.

DIP LAB
ICS-752
w.e.f. Session 2015-16

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List of Experiments

1. Write program to read and display digital image.
2. To write and execute image processing programs using point processing method
 - Obtain Negative image
 - Obtain Flip image
 - Thresholding
 - Contrast stretching
3. To write and execute programs for image arithmetic operations
 - Addition of two images
 - Subtract one image from other image
 - Calculate mean value of image
 - Different Brightness by changing mean value
4. To write and execute programs for image logical operations
 - AND operation between two images
 - OR operation between two images
 - Calculate intersection of two images
 - Water Marking using EX-OR operation
 - NOT operation (Negative image)
5. To write a program for histogram calculation and equalization
 - Standard MATLAB function
 - Program without using standard MATLAB functions
 - C Program
 - Use Simulink to plot histogram of colour image
6. To write and execute program for geometric transformation of image
 - Translation
 - Scaling
 - Rotation
 - Shrinking
 - Zooming
7. To understand various image noise models and to write programs for image restoration
 - Remove Salt and Pepper Noise
 - Minimize Gaussian noise
 - Median filter and Weiner filter
8. Write and execute programs to remove noise using spatial filters
 - Understand 1-D and 2-D convolution process
 - Use 3x3 Mask for low pass filter and high pass filter
9. Write and execute programs for image frequency domain filtering
 - Apply FFT on given image
 - Perform low pass and high pass filtering in frequency domain
 - Apply IFFT to reconstruct image
10. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask
11. Write and execute program for image morphological operations erosion and dilation.
12. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.

PROJECT
ICS 754
w.e.f. Session 2015-16

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Students are expected to identify the problem, which would be carried out as a project work during whole year. Student must complete requirement & Specification, Feasibility study, Analysis, Project Schedule, detailed design etc of the project and synopsis must be approved by the department/project Guide. Students are encouraged to interact with local Industry for project work. The Project with R & D nature will be appreciated.