JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
(Established by Andhra Pradesh Act No.30 of 2008)
Kukatpally, Hyderabad – 500 085, TELANGANA (India)

ADD-ON COURSE STRUCTURE FOR III AND IV YEARS EFFECTIVE AFTER OCTOBER 2015
B. TECH. INFORMATION TECHNOLOGY /COMPUTER SCIENCE AND TECHNOLOGY

Note :

1) Qualification pack for ASSOCIATE ANALYTICS includes the following three subjects
  1. Introduction to Analytics
  2. Big Data Analytics
  3. Predictive Analytics

2) Qualification pack for SECURITY ANALYST includes the following three subjects
  1. Information Security Management
  2. Information Security Assessments & Audits
  3. Information Security Incident Response & Management

*For registering for **Big Data Analytics** the prerequisite is **Introduction to Analytics**
*For registering for **Information Security Assessments & Audits** the prerequisite is **Information Security Management**

IV YEAR I SEMESTER

Code	Subject	L	T/P/D	C
	Information Security	4	-	4
	Design Patterns	4	-	4
	Mobile Application Development	4	-	4
	Information Retrieval Systems	4	-	4
	ELECTIVE – I Wireless Networks and Mobile Computing Image Processing and Pattern Recognition Soft Computing Semantic Web and Social Networks Operations Research *Big Data Analytics (Associate Analytics-2) *** *Information Security Assessments & Audits (Security Analyst-2) ***	4	-	4
	ELECTIVE – II Software Project Management Computer Graphics Human Computer Interaction Scripting Languages Computer Forensics	4	-	4
	Case Tools and Software Testing Lab	-	3	2
	Mobile Applications Development Lab	-	3	2
	Total	24	6	28

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IV Year B.Tech. IT/CST-I Sem

L	T/P/D	C
4	-/-/-	4

(A70522) INFORMATION SECURITY

Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

UNIT – I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT – II

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution **Asymmetric key Ciphers:** Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution

UNIT – III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm **Authentication Applications:** Kerberos, X.509

Authentication Service, Public – Key Infrastructure, Biometric Authentication

UNIT – IV

E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management

UNIT – V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction **Intruders, Virus and Firewalls:** Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls **Case Studies on Cryptography and security:** Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

TEXT BOOKS:

1. Cryptography and Network Security : William Stallings, Pearson Education,4th Edition.
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd Edition.

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition.
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

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(A70530) DESIGN PATTERNS

Objectives:

- Understand the design patterns that are common in software applications.
- Understand how these patterns are related to Object Oriented design.

UNIT-I

Introduction : What Is a 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, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary .

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

UNIT-III

Structural Pattern Part-I : Adapter, Bridge, Composite.

Structural Pattern Part-II : Decorator, açade, Flyweight, Proxy.

UNIT-IV

Behavioral Patterns Part-I : Chain of Responsibility, Command, Interpreter, Iterator.

Behavioral Patterns Part-II : Mediator, Memento, Observer.

UNIT-V

Behavioral Patterns Part-II (cont'd): State, Strategy, Template Method,Visitor, Discussion of Behavioral Patterns.

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

TEXT BOOK :

1. Design Patterns By Erich Gamma, Pearson Education.

REFERENCE BOOKS :

1. Pattern's in JAVA Vol-I By Mark Grand, Wiley DreamTech.

2. Pattern's in JAVA Vol-II By Mark Grand, Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand, Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd.
5. Peeling Design Patterns, Prof. Meda Srinivasa Rao, Narsimha Karumanchi, CareerMonk Publications.
6. Design Patterns Explained By Alan Shalloway,Pearson Education.
7. Pattern Oriented Software Architecture, F.Buschmann&others, John Wiley & Sons.

Outcomes:

o Ability to understand and apply common design patterns to incremental / iterative development.
o Ability to identify appropriate patterns for design of given problem.

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	4	-/-/-	4

(A70535) MOBILE APPLICATION DEVELOPMENT

Mobile application development is the process by which application software is developed for low-power handheld devices, such as personal digital assistants, enterprise digital assistants or mobile phones. These applications can be pre-installed on phones during manufacture, downloaded by customers from various mobile software distribution platforms, or delivered as web applications using server-side or client-side processing (e.g. JavaScript) to provide an "application-like" experience within a Web browser. Application software developers also have to consider a lengthy array of screen sizes, hardware specifications and configurations because of intense competition in mobile software and changes within each of the platforms.

Objectives:

On completion of this course the students should be able to:

1. Design, implement and evaluate a User Interface for a mobile application using J2ME.
2. Create a small but realistic working mobile application for small computing devices.
3. Categorise the challenges posed by developing mobile applications and be able to propose and evaluate and select appropriate solutions.

UNIT- I

J2ME Overview : Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices

Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants

UNIT- II

J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit

J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices

UNIT- III

Commands, Items, and Event Processing: J2ME User Interfaces, Display

Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling

High-Level Display: Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class

Low-Level Display: Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation

UNIT- IV

Record Management System: Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener

JDBC Objects: The Concept of JDBC, JDBC Driver Types, JDBC Packages, Overview of the JDBC Process, Database Connection, statement Objects, Result set, Transaction Processing, Metadata, Data Types, Exceptions.

JDBC and Embedded SQL: Model Programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Metadata, Updating Tables, Deleting Data form a Table, Joining Tables, Calculating Data, Grouping and Ordering Data, Subqueries, VIEWs

UNIT- V

Generic Connection Framework: The Connection, Hypertext Transfer Protocol, Communication Management Using HTTP Commands, Session Management, Transmit as a Background Process

TEXT BOOKS:

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
2. Programming for Mobile and Remote Computers, G.T.Thampi, dreamtech press.

REFERENCE BOOKS:

1. Enterprise J2ME: Developing Mobile Java Applications – Michael Juntao Yuan, Pearson Education, 2004
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005
4. Kicking Butt with MIDP and MSA:Creating Great Mobile Applications,1st edition, J.Knudsen, Pearson.

Outcomes:

- Ability to evaluate and select appropriate solutions to the mobile computing platform.
- Ability to develop the user interface.
- Ability design a simple mobile phone game.

	L	T/P/D	C
	4	-/-/-	4

(A70533) INFORMATION RETRIEVAL SYSTEMS

Objectives:

- To learn the different models for information storage and retrieval
- To learn about the various retrieval utilities
- To understand indexing and querying in information retrieval systems
- To expose the students to the notions of structured and semi structured data
- To learn about web search

UNIT-I

Introduction, Retrieval Strategies: Vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language Models.

UNIT-II

Retrieval Utilities: Relevance feedback, Clustering, N-grams, Regression analysis, Thesauri.

UNIT-III

Retrieval Utilities: Semantic networks, Parsing

Cross-Language Information Retrieval: Introduction, Crossing the language barrier.

UNIT-IV

Efficiency: Inverted index, Query processing, Signature files, Duplicate document detection.

UNIT-V

Integrating Structured Data and Text: A Historical progression, Information retrieval as a relational application, Semi-structured search using a relational schema

Distributed Information Retrieval: A Theoretical model of distributed retrieval, Web search.

TEXT BOOK:

1. David A. Grossman, Ophir Frieder, Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition (Distributed by Universities Press), 2004.

REFERENCE BOOKS:

1. Gerald J Kowalski, Mark T Maybury. Information Storage and Retrieval Systems, Springer, 2000

2. Soumen Chakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan-Kaufmann Publishers, 2002

3. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, An Introduction to Information Retrieval, Cambridge University Press, Cambridge, England, 2009

Outcomes:

- Possess the ability to store and retrieve textual documents using appropriate models

- Possess the ability to use the various retrieval utilities for improving search

- Possess an understanding of indexing and compressing documents to improve space and time efficiency

- Possess the skill to formulate SQL like queries for unstructured data

- Understand issues in web search

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(A70541) WIRELESS NETWORKS AND MOBILE COMPUTING
(ELECTIVE - I)

Objectives:

- To understand GSM and UMTS architectures
- To have an in-depth knowledge of mobile computing
- To understand Mobile network layer and transport layer
- To understand Bluetooth technology

UNIT – I

Introduction to Network Technologies and Cellular Communications

HIPERLAN: Protocol Architecture, Physical Layer, Channel Access Control Sub-layer, MAC Sub-layer, Information Bases and Networking

WLAN: Infrared vs. Radio Transmission, Infrastructure and Ad Hoc Networks, IEEE 802.11. Bluetooth.: User Scenarios, Physical Layer, MAC layer, Networking, Security, Link Management

GSM: Mobile Services, System Architecture, Radio Interface, Protocols, Localization and calling, Handover, Security, and New Data Services.

Mobile Computing (MC): Introduction to MC, Novel Applications, Limitations, and Architecture

UNIT –II

(Wireless) Medium Access Control (MAC): Motivation for a Specialized MAC (Hidden and Exposed Terminals, Near and Far Terminals), SDMA, FDMA, TDMA, CDMA. MAC Protocols for GSM, Wireless LAN (IEEE802.11), Collision Avoidance (MACA, MACAW) Protocols.

UNIT –III

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

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

UNIT- IV

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

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Methods, Digital Audio and Video Broadcasting (DAB & DVB). Data Synchronization – Introduction, Software, and Protocols

UNIT- V

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

Protocols and Platforms for Mobile Computing WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices.

TEXT BOOKS

1. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772
2. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004

REFERENCE BOOKS

1. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.
2. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, Oct 2004,

Outcomes:

Ability to understand the strengths and limitations of mobile/wireless networks

Ability to design and analyze the performance of location update algorithms for cellular networks;

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	4	-/-/-	4

(A70532) IMAGE PROCESSING AND PATTERN RECOGNITION
(ELECTIVE - I)

Objectives:

*   Adequate background knowledge about image processing and pattern recognition
*   Practical knowledge and skills about image processing and pattern recognition tools
*   Necessary knowledge to design and implement a prototype of an image processing and pattern recognition *application*.

UNIT – I

Fundamental steps of image processing, components of an image processing of system. The image model and image acquisition, sampling and quantization, relationship between pixels, distance functions, scanner.

Statistical and spatial operations, Intensity functions transformations, histogram processing, smoothing & sharpening – spatial filters Frequency domain filters, homomorphic filtering, image filtering & restoration. Inverse and weiner filtering, FIR weiner filter, Filtering using image transforms, smoothing splines and interpolation.

UNIT – II

Morphological and other area operations, basic morphological operations, opening and closing operations, dilation erosion, Hit or Miss transform, morphological algorithms, extension to grey scale images.

Segmentation and Edge detection region operations, basic edge detection, second order detection, crack edge detection, gradient operators, compass and Laplace operators, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds.

UNIT –III

Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive technique, pixel coding, transfer coding theory, lossy and lossless predictive type coding, Digital Image Water marking.

UNIT –IV

Representation and Description: Chain codes, Polygonal approximation, Signature Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description,

Relational Descriptors

UNIT- V

Pattern Recognition Fundamentals: Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

Pattern classification: Pattern classification by distance function: Measures of similarity, Clustering criteria, K-means algorithm, Pattern classification by likelihood function: Pattern classification as a Statistical decision problem, Bayes classifier for normal patterns.

TEXT BOOKS

1. Digital Image Processing Third edition, Pearson Education, Rafael C. Gonzalez, Richard E. Woods.
2. Pattern recognition Principles: Julus T. Tou, and Rafel C. Gonzalez, Addision-Wesly Publishing Company.
3. Digital Image Processing, M.Anji Reddy, Y.Hari Shankar, BS Publications.

REFERENCE BOOKS:

1. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, Vaclav Hlavac and Roger Boyle. Thomson learning
2. Digital Image Processing – William k. Pratl –John Wiley edition.
3. Fundamentals of digital image processing – by A.K. Jain, PHI.
4. Pattern classification, Richard Duda, Hart and David strok John Wiley publishers.
5. Digital Image Processing, S.Jayaraman,S. Esakkirajan, T.Veerakumar, TMH.
6. Pattern Recognition, R.Shinghal, Oxford University Press.

Outcomes:

Ability to apply computer algorithms to practical problems.

Ability to image segmentation, reconstruction and restoration.

Ability to perform the classification of patterns

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	4	-/-/-	4

(A70539) SOFT COMPUTING
(ELECTIVE - I)

Objectives:

To give students knowledge of soft computing theories fundamentals, ie. Fundamentals of artificial and neural networks, fuzzy sets and fuzzy logic and genetic algorithms.

UNIT-I

AI Problems and Search: AI problems, Techniques, Problem Spaces and Search, Heuristic Search Techniques- Generate and Test, Hill Climbing, Best First Search Problem reduction, Constraint Satisfaction and Means End Analysis. Approaches to Knowledge Representation- Using Predicate Logic and Rules.

UNIT-II

Artificial Neural Networks: Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-III

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-IV

Introduction to Classical Sets (crisp Sets)and Fuzzy Sets- operations and Fuzzy sets. Classical Relations -and Fuzzy Relations- Cardinality, Operations, Properties and composition. Tolerance and equivalence relations.

Membership functions- Features, Fuzzification, membership value assignments, Defuzzification.

UNIT-V

Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule Base and Approximate Reasoning Fuzzy Decision making

Fuzzy Logic Control Systems. Genetic Algorithm- Introduction and basic operators and terminology. Applications: Optimization of TSP, Internet Search Technique

TEXT BOOKS:

1. Principles of Soft Computing- S N Sivanandam, S N Deepa, Wiley India, 2007.
2. Soft Computing and Intelligent System Design -Fakhreddine O Karray, Clarence D Silva, Pearson Edition, 2004.

REFERECE BOOKS :

1. Artificial Intelligence and SoftComputing- Behavioural and Cognitive Modelling of the Human Brain- Amit Konar, CRC press, Taylor and Francis Group.
2. Artificial Intelligence – Elaine Rich and Kevin Knight, TMH, 1991, rp2008.
3. Artificial Intelligence – Patric Henry Winston – Third Edition, Pearson Education.
4. A first course in Fuzzy Logic-Hung T Nguyen and Elbert A Walker, CRC. Press Taylor and Francis Group.
5. Artificial Intelligence and Intelligent Systems,N.P.Padhy, Oxford Univ. Press.

Outcomes:

- Ability to build intelligent machines using soft computing techniques
- Ability to apply fuzzy logic to handle uncertainty problems.
- Ability to apply neural networks for classifications.

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	L	T/P/D	C
	4	-/-/-	4

(A70538) SEMANTIC WEB AND SOCIAL NETWORKS
(ELECTIVE – I)

Objectives:

- To learn Web Intelligence
- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

UNIT- I

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web.

Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT- II

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL),UML,XML/XML Schema.

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping.

UNIT- III

Logic, Rule and Inference Engines. Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base.

UNIT- IV

XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods, What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks.

UNIT- V

Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Thinking on the Web - Berners Lee,Godel and Turing, Wiley interscience,2008.
2. 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, Rudi Studer, Paul 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.

Outcomes:

- Ability to understand and knowledge representation for the semantic web.
- Ability to create ontology.
- Ability to build a blogs and social networks

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	4	-/-/-	4

(A70352) OPERATIONS RESEARCH
(ELECTIVE-I)

UNIT – I

Development – Definition– Characteristics and Phases – Types of models – Operations Research models – applications.

Allocation: Linear Programming Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques: Two–phase method, Big-M method.

UNIT – II

Transportation Problem – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.

Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem- Traveling Salesman problem.

UNIT – III

Sequencing – Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines

Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.

UNIT – IV

Theory of Games: Introduction –Terminology– Solution of games with saddle points and without saddle points- 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.

Inventory: Introduction – Single item, Deterministic models – Purchase inventory models with one price break and multiple price breaks –Stochastic models – demand may be discrete variable or continuous variable – Single Period model and no setup cost.

UNIT – V

Waiting Lines: Introduction – Terminology-Single Channel – Poisson arrivals and Exponential Service times – with infinite population and finite population models– Multichannel – Poisson arrivals and exponential service times with infinite population.

DYNAMIC Programming: Introduction – Terminology- Bellman's Principle of Optimality – Applications of dynamic programming- shortest path problem

– linear programming problem.

Simulation: Introduction, Definition, types of simulation models, Steps involved in the simulation process- Advantages and disadvantages- applications of simulation to queuing and inventory.

TEXT BOOK :

1. Operations Research /J.K.Sharma 4e. /MacMilan
2. Introduction to O.R/Hillier & Libermann/TMH

REFERENCE BOOKS :

1. Introduction to O.R /Taha/PHI
2. Operations Research/ NVS Raju/ SMS Education/3rd Revised Edition
3. Operations Research /A.M.Natarajan, P.Balasubramaniam, A. Tamilarasi/Pearson Education.
4. Operations Research / Wagner/ PHI Publications.
5. Operations Research/M.V. Durga Prasad, K, Vijaya Kumar Reddy, J. Suresh Kumar/ Cengage Learning.

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	4	-/-/-	4

(A70540) SOFTWARE PROJECT MANAGEMENT
(Elective-II)

Objectives:

The main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management). The goals of the course can be characterized as follows:

1. Understanding the specific roles within a software organization as related to project and process management

2. Understanding the basic infrastructure competences (e.g., process modeling and measurement)

3. Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships

UNIT- I

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

UNIT- II

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

The old way and the new: The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process.

UNIT- III

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering

artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

UNIT- IV

Work Flows of the process : Software process workflows, Inter trans workflows. Checkpoints of the Process : Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

Project Organizations and Responsibilities : Line-of-Business Organizations. Project Organizations, evolution of Organizations.

Process Automation : Automation Building Blocks, The Project Environment.

UNIT- V

Project Control and Process instrumentation : The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants, Example.

Future Software Project Management : Modern Project Profiles Next generation .

Software economics, modern Process transitions.

Case Study : The Command Centre Processing and Display System-Replacement(CCPDS-R).

TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education.
2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition,Tata Mc-Graw Hill.

REFERENCE BOOKS:

1. Applied Software Project Management, Andrew Stellman & Jennifer Greene,O'Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly,2007
3. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004
5. The art of Project management, Scott Berkun, O'Reilly, 2005.
6. Software Project Management in Practice, Pankaj Jalote, Pearson Education,2002.

Outcomes:

At the end of the course, the student shall be able to:

●   Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.

●   Compare and differentiate organisation structures and project structures.

●   Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

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	4	-/-/-	4

BIG DATA ANALYTICS (ASSOCIATE ANALYTICS – II)
(Elective-I)

Unit I:
Data Management (NOS 2101):
Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/signal/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Preprocessing.
Export all the data onto Cloud ex. AWS/Rackspace etc.
Maintain Healthy, Safe & Secure Working Environment (NOS 9003):
Introduction, workplace safety, Report Accidents & Emergencies, Protect health & safety as your work, course conclusion, assessment

Unit II
Big Data Tools (NOS 2101):
Introduction to Big Data tools like Hadoop, Spark, Impala etc., Data ETL process, Identify gaps in the data and follow-up for decision making.
Provide Data/Information in Standard Formats (NOS 9004):
Introduction, Knowledge Management, Standardized reporting & compliances, Decision Models, course conclusion. Assessment.

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

Unit IV
Machine Learning Algorithms (NOS 9003):
Hypothesis testing and determining the multiple analytical methodologies, Train Model on 2/3 sample data using various Statistical/Machine learning algorithms, Test model on 1/3 sample for prediction etc.

Unit V
(NOS 9004)
Data Visualization (NOS 2101):
Prepare the data for Visualization, Use tools like Tableau, QlickView and D3, Draw insights out of Visualization tool.
Product Implementation

TEXT BOOK:
1. Student's Handbook for Associate Analytics.

REFERENCE BOOKS:
5. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley, 2006
6. Data Mining Analysis and Concepts, M. Zaki and W. Meira (the authors have kindly made an online version available): http://www.dataminingbook.info/uploads/book.pdf
7. Mining of Massive Datasets Jure Leskovec Stanford Univ. Anand RajaramanMilliway Labs Jeffrey D. Ullman Stanford Univ.
8. (http://www.vistrails.org/index.php/Course:_Big_Data_Analysis)

IV Year B.Tech. IT -I Sem

	L	T/P/D	C
	4	-/-/-	4

INFORMATION SECURITY ASSESSMENTS & AUDITS (SECURITY ANALYST – II)
(Elective-I)

Unit I
Information Security Performance Metrics and Audit:
Security Metrics and Reporting, Common Issues and Variances of Performance Metrics, Introduction to Security Audit, Servers and Storage devices, Infrastructure and Networks, Communication Routes, Information Security Methodologies (Black-box, White-box, Grey-box), Phases of Information Security Audit and Strategies, Ethics of an Information Security Auditor etc.
Maintain Healthy, Safe & Secure Working environment (NOS 9003).

Unit II
Information Security Audit Tasks, Reports and Post Auditing Actions:
Pre-audit checklist, Information Gathering, Vulnerability Analysis, External Security Audit, Internal Network Security Audit, Firewall Security Audit, IDS Security Auditing, Social Engineering Security Auditing, Web Application Security Auditing, Information Security Audit Deliverables & Writing Report, Result Analysis, Post Auditing Actions, Report Retention etc.
Provide Data/Information in Standard formats (NOS 9004).

Unit III
Vulnerability Management:
Information Security Vulnerabilities – Threats and Vulnerabilities, Human-based Social Engineering, Computer-based Social Engineering, Social Media Countermeasures, Vulnerability Management – Vulnerability Scanning, Testing, Threat management, Remediation etc.

Unit IV
Information Security Assessments:
Vulnerability Assessment, Classification, Types of Vulnerability Assessment, Vulnerability Assessment Phases, Vulnerability Analysis Stages, Characteristics of a Good Vulnerability Assessment Solutions &Considerations, Vulnerability Assessment Reports – Tools and choosing a right Tool, Information Security Risk Assessment, Risk Treatment, Residual Risk, Risk Acceptance, Risk Management Feedback Loops etc.

Unit V
Configuration Reviews:
Introduction to Configuration Management, Configuration Management Requirements-Plan-Control, Development of configuration Control Policies, Testing Configuration Management etc.

TEXT BOOKS:
Prescribed books:-
1. Assessing Information Security (strategies, tactics, logic and framework) by A Vladimirov, K.Gavrilenko, and A.Michajlowski
2. "The Art of Computer Virus Research and Defense by Peter Szor."

REFERENCES:
1. https://www.sans.org/reading-room/whitepapers/threats/implementing-vulnerability-management-process-34180
2. http://csrc.nist.gov/publications/nistpubs/800-40-Ver2/SP800-40v2.pdf

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IV Year B.Tech. IT/CST-I Sem

	L	T/P/D	C
	4	-/-/-	4

(A70529) COMPUTER GRAPHICS
(Elective- II)

Objectives:

- To make students understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.
- To make the student present the content graphically.

UNIT- I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT- II

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

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.

UNIT- III

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces, sweep representations, octrees BSP Trees,

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT- IV

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

Illumination Models and Surface rendering Methods: Basic illumination models, polygon rendering methods

UNIT- V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc Graw hill edition.

REFERENCE BOOKS:

1. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.
2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd edition.
3. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
4. "Principles of Computer Graphics", Shalini, Govil-Pai, Springer.
5. "Computer Graphics", Steven Harrington, TMH.
6. Computer Graphics, F.S.Hill, S.M.Kelley, PHI.
7. Computer Graphics, P.Shirley, Steve Marschner & Others, Cengage Learning.
8. Computer Graphics & Animation, M.C.Trivedi, Jaico Publishing House.
9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R.Goldman, CRC Press, Taylor&Francis Group.
10. Computer Graphics, Rajesh K.Maurya, Wiley India.

Outcomes:

- Students can animate scenes entertainment.
- Will be able work in computer aided design for content presentation.
- Better analogy data with pictorial representation.

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	4	-/-/-	4

(A70531) HUMAN COMPUTER INTERACTION
(Elective - II)

Objectives:

You will gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional „keyboard and mouse" computing; become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans; be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation; appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user; be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing; and understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems. Finally, working in small groups on a product design from start to finish will provide you with invaluable team-work experience.

UNIT- I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT- II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT- III

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT- IV

Software tools – Specification methods, interface – Building Tools.

UNIT- V

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.

2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.

REFERENCE BOOKS:

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education

2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.

3. User Interface Design, Soren Lauesen , Pearson Education.

4. Human –Computer Interaction,D.R.Olsen, Cengage Learning.

5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

Outcomes:

Ability to apply HCI and principles to interaction design.

Ability to design certain tools for blind or PH people.

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IV Year B.Tech. IT/CST-I Sem

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	4	-/-/-	4

(A70537) SCRIPTING LANGUAGES
(Elective – II)

Objectives:

The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Bio-data. The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

UNIT – I

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT – II

Advanced perl: Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

PHP Basics

PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Datatypes, Variables, Constants, expressions, string interpolation, control structures . Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT – III

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

UNIT – IV

TCL : TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures , strings , patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

UNIT – V

Python: Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling.

Integrated Web Applications in Python – Building Small, Efficient Python Web Systems ,Web Application Framework.

TEXT BOOKS:

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Python Web Programming , Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL , 3rd Edition , Jason Gilmore, Apress Publications (Dream tech.).

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python,M.Lutz,SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. PHP 5.1, I.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.

Outcomes:

- Ability to understand the differences between scripting languages.
- Ability to apply your knowledge of the weaknesses of scripting languages to select implementation.
- Master an understanding of python especially the object oriented concepts.

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4	-/-/-	4

(A70528) COMPUTER FORENSICS
(Elective-II)

Objectives:

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.

- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.

- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

UNIT – I

Computer Forensics Fundamentals: What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists

Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement – Computer Forensic Technology – Types of Business Computer Forensic Technology

Computer Forensics Evidence and Capture: Data Recovery Defined – Data Back-up and Recovery – The Role of Back-up in Data Recovery – The Data-Recovery Solution

UNIT – II

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence – Volatile Evidence – General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The Chain of Custody

Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting and Preserving Computer Forensic Evidence

Computer Image Verification and Authentication: Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation

UNIT – III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case

UNIT – IV

Current Computer Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software

E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT – V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS start up tasks, virtual machines.

TEXT BOOKS:

1. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.

2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Addison- Wesley Pearson Education

2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

3. Computer Evidence Collection & Presentation by Christopher L.T. Brown, Firewall Media.

4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media.

5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M.Slade, TMH 2005

6. Windows Forensics by Chad Steel, Wiley India Edition.

Outcomes:

- Students will be understanding the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.

- It gives an opportunity to students to continue their zeal in research in computer forensics.

(A70593) CASE TOOLS AND SOFTWARE TESTING LAB

Objectives:

- Understand how UML supports the entire OOAD process.
- Become familiar with all phases of OOAD.
- Understand different software testing techniques and strategies.
- Understand the procedure to write test plan and execution.
- Understand different software testing tools and their features

CASE TOOLS LAB

Students are divided into batches of 5 each and each batch has to draw the following diagrams using UML for an ATM system whose description is given below.

UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

Description for an ATM System

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of Rs. 100, Rs. 500 and Rs. 1000), a printer for printing customer receipts, and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link. (The software on the latter is not part of the requirements for this problem.)

The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction.

The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires no further transactions, at which point it will be returned - except as noted below.

The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of Rs. 100 or Rs. 500 or Rs. 1000. Approval must be obtained from the bank before cash is dispensed.

2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.

3. A customer must be able to make a transfer of money between any two accounts linked to the card.

4. A customer must be able to make a balance inquiry of any account linked to the card.

5. A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope. (If the customer fails to deposit the envelope within the timeout period, or presses cancel instead, no second message will be sent to the bank and the deposit will not be credited to the customer.)

If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back.

If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem, and will then ask the customer whether he/she wants to do another transaction.

The ATM will provide the customer with a printed receipt for each successful transaction

The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the „on"

position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the „off" position, the machine will shut down, so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts, etc.

Outcomes:

* Ability to understand the history, cost of using and building CASE tools.
* Ability to construct and evaluate hybrid CASE tools by integrating existing tools.
* Ability to deliver the product with qualitative.

SOFTWARE TESTING LAB

List of Experiments

1. Write programs in 'C' Language to demonstrate the working of the following constructs:

i) do...while ii) while....do iii) if...else iv) switch v) for

2. "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.

3. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4. Write the test cases for any known application (e.g. Banking application)

5. Create a test plan document for any application (e.g. Library Management System)

6. Study of any testing tool (e.g. Win runner)

7. Study of any web testing tool (e.g. Selenium)

8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)

9. Study of any test management tool (e.g. Test Director)

10. Study of any open source-testing tool (e.g. Test Link)

11. Take a mini project (e.g. University admission, Placement Portal) and execute it. During the Life cycle of the mini project create the various testing documents* and final test report document.

*Note: To create the various testing related documents refer to the text "Effective Software Testing Methodologies by William E. Perry"

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(A70597) MOBILE APPLICATIONS DEVELOPMENT LAB

Contents

Mobile Application Development (Through J2ME) LABORATORY

Objectives:

Week - 1: Installation of Java Wireless Toolkit (J2ME)

Week - 2 Working with J2ME Features

Week - 3 Threads & High Level UI

Week - 4 Working on Drawing and Images

Week - 5 Developing Networked Applications using the Wireless Toolkit

Week - 6 Authentication with a Web Server

Week - 7 & 8 Web Application using J2ME

Outcomes:

1. Ability to install J2ME toolkit.
2. Ability to develop the user interface and authenticate with a Web Server..
3. Ability to design Web application using J2ME.

Mobile Application Development (Through J2ME) LABORATORY

Objective:

In this lab, a student is expected to design, implement, document and present a mobile client/server system using standard Java and Java 2 Micro Edition (J2ME) platform. Specifically it is required to design and implement a system that consists mainly of a mobile client (MC) and a Proxy Server (PS). MC will be written in J2ME, MIDP 2.0, while PS will be written in standard Java. It is necessary to use a mobile phone emulator to develop and demonstrate the experiments.

It may be necessary to use other components or existing resources (servers) as needed. For instance a database local to PS or a web service available on the Internet that can be invoked by the PS.

Week - 1: Installation of Java Wireless Toolkit (J2ME)

1) If the Java Development Kit (JDK) is not there or only having the Java Runtime Environment (JRE) installed, install the latest JDK from http://java.sun.com/javase/downloads/index.jsp. Current stable release of Java is JDK 6 Update 7 but check the web page in case there are newer non-beta releases available.

2) Next, download the **Java Wireless Toolkit** (formerly called J2ME Wireless Toolkit) from: http://java.sun.com/products/sjwtoolkit/download.html.

3) Run the installer (for example, for Windows it is: sun_java_wireless_toolkit- 2_5_2-windows.exe). The installer checks whether a compatible Java environment has been pre-installed. If not, it is necessary to uninstall old versions of Java and perform Step 1 again.

Once after successful installation of Java and the tool kit compile this program and run the following program in the toolkit.

Steps to run this program in toolkit:

1. Start -> All Programs -> Sun Java Tool Kit -> Wireless Tool Kit
2. Click New Project – Enter Project Name -> Enter Class Name -> Click on Create Project.
3. Choose appropriate API Selection and Configurations.
4. Place Java Source file in WTK2.1 / WTK2.2\ apps\ projectname\ src
5. Build the Project.
6. Run the Project.

```
import javax.microedition.lcdui.*;
import javax.microedition.midlet.*;
public class HelloWorld extends MIDlet{
private Form form;
private Display display;
public HelloWorld(){
super();
}
public void startApp(){
form = new Form("Hello World");
String msg = "Hello World!!!!!!!";
form.append(msg);
display = Display.getDisplay(this);
display.setCurrent(form);
}
public void pauseApp(){}
public void destroyApp(boolean unconditional){
notifyDestroyed();
```
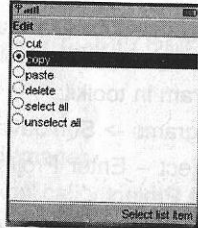
Week - 2 Working with J2ME Features:

Working with J2ME Features: Say, creating a *Hello World* program Experiment with the most basic features and mobile application interaction concepts (lists, text boxes, buttons, radio boxes, soft buttons, graphics, etc)

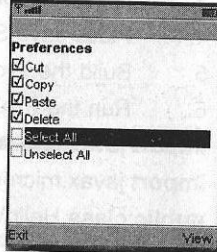### 2.1 Create a program which creates to following kind of menu.

* cut
* copy
* past
* delete
* select all
* unselect all

2.2 Event Handling.

Create a menu which has the following options:

* 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 options off

2.3. Input checking

Create an MIDP application which examine, that a phone number, which a user has entered is in the given format.

* Area code should be one of the following: 040, 041, 050, 0400, 044
* There should 6-8 numbers in telephone number (+ area code)
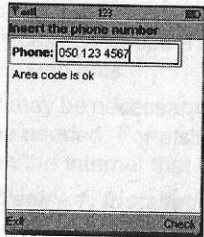
Week - 3 Threads & High Level UI:

3.1. Create a slide show which has three slides, which includes only text. Program should change to the new slide after 5 seconds. After the third slide program returns to the first slide.
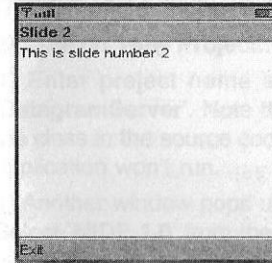
3.2 High-level UI

Create a MIDP application, which show to the user 5-10 quiz questions. All questions have 4 possible options and one right option exactly. Application counts and shows to the user how many right answers were right and shows them to user.
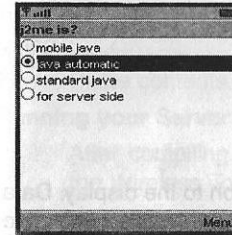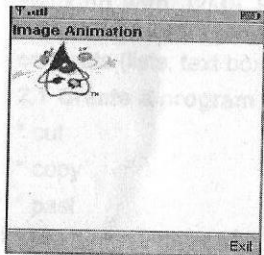
3.3 Create a MIDP application, where the user can enter player name and points. The program saves the information to the record using RMS at MIDP device. Program should also print out the top 10 player list to the end user. You can use this class in your game if you made own class for saving and reading record sets.
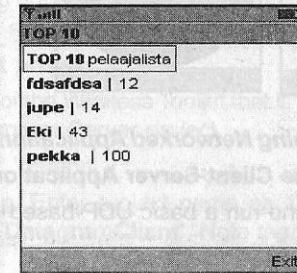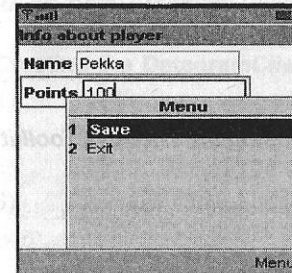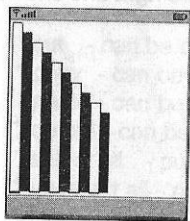
Week - 4 Working on Drawing and Images

4.1 Create a slide show which has three slides, which includes pictures at PNG format. Program should change to the new slide other 5 seconds.

4.2 Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array.

4.3 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.
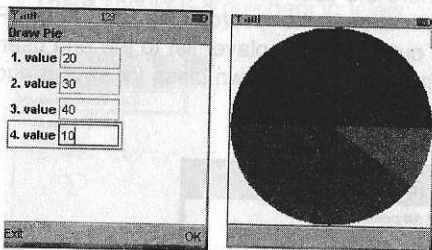
Week - 5 Developing Networked Applications using the Wireless Toolkit

Creating a Simple Client-Server Application

Create, compile and run a basic UDP-based client-server application.

Creating the Datagram Server project

1) Click on Wireless Toolkit 2.5.2 under the group: **All Programs?Sun Java (TM) Wireless Toolkit 2.5.2**.

2) Click on '**New Project...**' button.

3) Enter project name as '**DatagramServer**'. Enter MIDlet name as '**DatagramServer**'. Note that the Midlet name is the same as the name of the class in the source code, which extends the MIDlet class, otherwise the application won't run.

4) Another window pops up where it is required to select a target platform. Select '**MIDP 1.0**' from the drop down list.

5) After clicking OK, the project is created; and the Wireless Toolkit tells that the name of the folder where source code files are created. The path of the source code folder is displayed in the debug output window.

Creating and Compiling the DatagramServer source files

The Wireless Toolkit does not come with an IDE by default so Use any IDE or a text editor like *Notepad*.

1) Create a new text file called **DatagramServer.java** in the source folder of the project. The exact path of this folder is displayed in the Wireless Toolkit window.

2) Paste contents **DatagramServer.java** from into the source file.

Running your Server application on the Phone simulator

1) After compiling the project successfully, click on the Run button in the Wireless Toolkit window.

2) A graphical window depicting a phone handset will appear with the name of your application highlighted on its screen as shown below.

3) To start the application, click on the right soft-key (marked with a dot) below the '**Launch**' command.

4) The phone simulator might ask if it is OK to run the network application. Select '**Yes**' by clicking on the appropriate soft-key. The server is now up and running.

5) Keep the server running during the creation, compilation and running of the Datagram Client application.

Creating the DatagramClient project

1) Use the same instance of the Wireless Toolkit that is used for creating and compiling the Datagram Server project.

2) Click on '**New Project...**' button.

3) A new window pops up. Enter project name as '**DatagramClient**'. Enter MIDlet name as '**DatagramClient**'. Note that the Midlet name

is the same as the name of the class in the source code, which extends the MIDlet class.

4) Another window pops up where one has to select a target platform. Select '**MIDP 1.0**' from the drop down list.

5) After clicking OK, the project is created and the Wireless Toolkit tells where to place the source code files. The path of the source code folder is displayed in the debug output window as explained before.

Creating and Compiling the DatagramClient source files

1) Create a new text file called **DatagramClient.java** in the source folder of the project.

2) Paste contents **DatagramClient.java** into the source file.

3) Then click on the Build button in the Wireless Toolkit window. If the compilation is OK, it will say Build Complete in the window's debug output window, otherwise it will show the errors. <u>Note</u>: In the source code, use the System.out.println() statement to output debug information to this window.

Running your Client application on the Phone simulator

1) After compiling the project successfully, click on the Run button in the Wireless Toolkit window.

2) A graphical window depicting a phone handset will appear with the name of the application highlighted on its screen.

3) To start the application, click on the right soft-key (marked with a dot) below the '**Launch**' command.

4) The phone simulator might ask if it is OK to run the network application. Select '**Yes**' by clicking on the appropriate soft-key. The client is now up and running.

5) When the client executes on the phone simulator, one should see a text box with the caption 'Message'. Enter any message and press the right soft-key (corresponding to Send). If the client-server application is working properly, the screen of the server phone will display the message sent by the client and the client screen will now display a message sent by the server in response. The response message from the server is the original client message in reverse.

6) Try various features of the phone simulator including the different look-and-feel options.

Week - 6 Authentication with a Web Server

6.1 Write a sample program to show how to make a SOCKET Connection from j2me phone.

This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. shows how to make a SOCKET connection from the phone to port 80.

6.2 Login to HTTP Server from a J2ME Program

This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server.

Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server.

Note: Use Apache Tomcat Server as Web Server and Mysql as Database Server.

Week - 7 & 8 Web Application using J2ME

The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)

- Students Marks Enquiry
- Town/City Movie Enquiry
- Railway/Road/Air (For example PNR) Enquiry/Status
- Sports (say, Cricket) Update
- Town/City Weather Update
- Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Students into Batches and suggest them to design database according to their domains and render information according to their requests.