**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

***(Established by Govt. of A.P., Act. No. 30 of 2008)***

**ANANTHAPURAMU – 515 002 (A.P.) INDIA.**

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**Course Structure for B.Tech-R15 Regulations**

**Information Technology**

**B.Tech III-I Semester (IT)**

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| --- | --- | --- | --- | --- | --- | --- |
| **S.****No.** | **Course** **Code** | **Subject** | **L** | **T** | **P** | **C** |
| 1. | 15A05502 | Computer Networks  | 3 | 1 | - | 3 |
| 2. | 15A05503 | Object Oriented Analysis & Design | 3 | 1 | - | 3 |
| 3. | 15A05404 | Formal Languages & Automata Theory | 3 | 1 | - | 3 |
| 4. | 15A05602 | Data Warehousing & Mining  | 3 | 1 | - | 3 |
| 5. | 15A05604 | Design and Analysis of Algorithms | 3 | 1 | - | 3 |
| 6. | 15A0550615A0470215A12501 | **MOOCS-I\***a. Introduction to Big Data b. Embedded Systemsc. Computer Animation  | 3 | 1 | - | 3 |
| 7. | 15A12502 | UML And Computer Networks Laboratory | - | - | 4 | 2 |
| 8. | 15A05610 | Data warehousing & Mining Laboratory | - | - | 4 | 2 |
| 9. | 15A99501 | Audit course – Social Values & Ethics | 2 | 0 | 2 | 0 |
|  **Total:** | **20** | **6** | **10** | **22** |

6 Theory + 2 Laboratories

 \*Either by MOOCS manner or Conventional manner

**B.Tech III-II Semester (IT)**

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| --- | --- | --- | --- | --- | --- | --- |
| **S.****No.** | **Course** **Code** | **Subject** | **L** | **T** | **P** | **C** |
| 1. | 15A05505 | Software Testing  | 3 | 1 | - | 3 |
| 2. | 15A05702 | Information Security  | 3 | 1 | - | 3 |
| 3. | 15A12601 | Web Technologies  | 3 | 1 | - | 3 |
| 4. | 15A05601 | Compiler Design  | 3 | 1 | - | 3 |
| 5. | 15A12602 | Cloud Computing  | 3 | 1 | - | 3 |
| 6. | 15A1260315A0560815A01608 | **CBCC-I**a. Image Processing b. System Applications & Products (SAP)c. Intellectual Property Rights | 3 | 1 | - | 3 |
| 7. | 15A12604 | Software Testing Laboratory | - | - | 4 | 2 |
| 8. | 15A12605 | Web Technologies Laboratory | - | - | 4 | 2 |
| 9. | 15A52602 | Advanced English Language Communication Skills (AELCS) Laboratory (Audit Course) | - | - | 2 | - |
| 10. | 15A12606 | Comprehensive Online Examination-II | - | - | - | 1 |
| **Total:**  | **18** | **6** | **12** | **23** |

6 Theory + 2 Laboratories

**B.Tech IV-I Semester (IT)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.****No.** | **Course** **Code** | **Subject** | **L** | **T** | **P** | **C** |
| 1. | 15A52601 | Management Science  | 3 | 1 | - | 3 |
| 2. | 15A12701 | Internetworking with TCP/IP  | 3 | 1 | - | 3 |
| 3. | 15A12702 | Scripting Languages | 3 | 1 | - | 3 |
| 4. | 15A05703 | Mobile Application Development | 3 | 1 | - | 3 |
| 5. | 15A0570615A0570715A05805 | **CBCC-II**a. Machine Learningb. Software Project Managementc. Enabling Technologies for Data Science & Analytics: IoT  | 3 | 1 | - | 3 |
| 6. | 15A1270315A1270415A05709 | **CBCC-III**a. Human Computer Interaction b. Information Retrieval Systems c. Real Time Systems | 3 | 1 | - | 3 |
| 7. | 15A12705 | Scripting Languages Laboratory | - | - | 4 | 2 |
| 8. | 15A05711 | Mobile Application Development Laboratory | - | - | 4 | 2 |
|  **Total:** | **18** | **6** | **8** | **22** |

6 Theory + 2 Laboratories

**B.Tech IV-II Semester (IT)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.****No.** | **Course** **Code** | **Subject** | **L** | **T** | **P** | **C** |
| 1. | 15A0580115A0580215A05803 | **MOOCS-II\***a. Data Analyticsb. Mobile Computing c. Innovations and IT Management | 3 | 1 | - | 3 |
| 2. | 15A0580415A0550715A05806 | **MOOCS-III \***a. Building Large Scale Software Systems b. R- Programmingc. Cyber Security | 3 | 1 | - | 3 |
| 3. | 15A12801 | Comprehensive Viva Voce  | - | - | 4 | 2 |
| 4. | 15A12802 | Technical Seminar | - | - | 4 | 2 |
| 5. | 15A12803 | Project Work | - | - | 24 | 12 |
|  **Total:** | 6 | 02 | 32 | 22 |

 2 Theory + 1 Comprehensive Viva voce + 1 Technical Seminar + 1 Project work

\*Either by MOOCS manner or Self study or Conventional manner

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| **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR** |
| **B. Tech III-I Sem. (IT)** | **L** | **T** | **P** | **C** |
| **3** | **1** | **0** | **3** |
| **15A05502** |  **COMPUTER NETWORKS** |

**Course Objectives:**

* Study the evolution of computer networks and future directions.
* Study the concepts of computer networks from layered perspective.
* Study the issues open for research in computer networks.

**Course Outcomes:**

* Ability to choose the transmission media depending on the requirements.
* Ability to design new protocols for computer network.
* Ability to configure a computer network logically.

**Unit I**

**Introduction**: Networks, Network Types, Internet History, Standards and Administration, Network Models: Protocol Layering, TCP/IP Protocol Suite, The ISO Model.

**The Physical layer**: Data and Signals, Transmission impairment, Data rate limits, Performance, Transmission media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet switching.

**Unit II**

**The Data Link Layer**: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol, Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

**Unit III**

**The Network Layer**: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking, The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

**Unit IV**

**The Transport Layer**: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

**Unit V**

**The Application Layer**: Introduction, Client Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

**Text Books:**

1. “Data communications and networking”, Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.
2. “Computer Networks”, Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

**References:**

1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. “Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1, Douglas E. Comer, 5th edition, PHI
3. “Computer Networks”, 5E, Peterson, Davie, Elsevier.
4. “Introduction to Computer Networks and Cyber Security”, Chawan- Hwa Wu, Irwin, CRC Publications.
5. “Computer Networks and Internets with Internet Applications”, Comer.

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| **3** | **1** | **0** | **3** |
|  **15A05503** |  **OBJECT ORIENTED ANALYSIS & DESIGN** |

**Course Objectives**

* To understand how to solve complex problems
* Analyze and design solutions to problems using object oriented approach
* Study the notations of Unified Modeling Language

**Course Outcomes:**

* Ability to find solutions to the complex problems using object oriented approach
* Represent classes, responsibilities and states using UML notation
* Identify classes and responsibilities of the problem domain

**Unit-I**

**Introduction**: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

**Unit-II**

**Classes and Objects**: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

**Unit-III**

**Introduction to UML**: Why model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

**Unit-IV**

**Structural Modeling**: Package Diagram, Composite Structure Diagram, Component Diagram, Deployment Diagram, Profile Diagram.

**Unit-V**

**Behavioral Modeling**: Use Case Diagram, Activity Diagrams, State Machine Diagrams, Sequence Diagram, Communication Diagram, Timing Diagram, Interaction Overview Diagram.

**Text Books:**

1. “Object- Oriented Analysis And Design with Applications”, Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, PEARSON, 3rd edition, 2013.
2. “The Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh, Ivar Jacobson, PEARSON 12th Impression, 2012.
3. http://www.omg.org/

**References:**

1. “Object-oriented analysis and design using UML”, Mahesh P. Matha, PHI
2. “Head first object-oriented analysis and design”, Brett D. McLaughlin, Gary Pollice, Dave West, O’Reilly
3. “Object-oriented analysis and design with the Unified process”, John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning

“The Unified modeling language Reference manual”, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

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| **15A05404** |  **FORMAL LANGUAGES AND AUTOMATA THEORY** |

***Course Objectives:***

* *Understand formal definitions of machine models.*
* *Classify machines by their power to recognize languages.*
* *Understanding of formal grammars, analysis*
* *Understanding of hierarchical organization of problems depending on their complexity*
* *Understanding of the logical limits to computational capacity*
* *Understanding of undecidable problems*

***Course Outcomes:***

* *At the end of the course, students will be able to*
* *Construct finite state diagrams while solving problems of computer science*
* *Find solutions to the problems using Turing machines*
* *Design of new grammar and language*

**UNIT I**

**Introduction:** Basics of set theory, Relations on sets, Deductive proofs, Reduction to definitions,Other theorem forms, Proving equivalences about sets, The Contrapositive, Proof by contradiction, Counter examples, Inductive proofs, Alphabets, Strings, Languages, Problems, Grammar formalism, Chomsky Hierarchy

**Finite Automata:** An Informal picture of Finite Automata, Deterministic Finite Automata (DFA),Non Deterministic Finite Automata (NFA), Applying FA for Text search, Finite Automata with

Epsilon transitions (є-NFA or NFA- є ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem.

**UNIT II**

**Regular Languages:** Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden‘s Theorem, Using Arden‘s theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from

RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problem‘s of RLS,

Applications of REs and FAs

**UNIT III**

**Context Free Grammars and Languages:** Definition of Context Free Grammars (CFG), Derivationsand Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language.

**UNIT IV**

**Push Down Automata (PDA):** Informal introduction, The Formal Definition, Graphical notation,Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Two Stack PDA.

**UNIT V**

**Turing Machines and Undecidability:** Basics of Turing Machine (TM), Transitional Representationof TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar , Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undeciadable problems about TMs, Post‘s Correspondence Problem(PCP), Modified PCP.

***Text Books:***

*1.* *Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu kandar, Pearson.*

1. *Introduction to Automata Theory, Languages, and Computation, Third Edition, John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, Pearson.*

***Reference Books:***

1. *Introduction to Languages and the Theory of Computation, John C Martin, TMH, Third Edition.*
2. *Theory of Computation, Vivek Kulkarni, OXFORD.*
3. *Introduction to the Theory of Computation., Michel Sipser, 2nd Edition, Cengage Learning*

*4. Theory of computer Science Automata, Languages and Computation, K.L.P. Mishra,Chandrasekaran, PHI, Third Edition.*

1. *Fundamentals of the Theory of Computation, Principles and Practice, Raymond Greenlaw, H. James Hoover, Elsevier, Morgan Kaufmann.*
2. *Finite Automata and Formal Language A Simple Approach, A.M. Padma Reddy, Pearson*

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| **3** | **1** | **0** | **3** |
|  **15A05602** |  **DATA WAREHOUSING & MINING** |

**Course Objectives:**

* To know the basic concepts and principles of data warehousing and data mining
* Learn pre-processing techniques and data mining functionalities
* Learn and create multidimensional models for data warehousing
* Study and evaluate performance of Frequent Item sets and Association Rules
* Understand and Compare different types of classification and clustering algorithms

**Course Outcomes:**

* Understand the basic concepts of data warehouse and data Mining
* Apply pre-processing techniques for data cleansing
* Analyze and evaluate performance of algorithms for Association Rules
* Analyze Classification and Clustering algorithms

**UNIT I**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT II**

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

**UNIT III**

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining, Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

**UNIT IV**

Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

**UNIT V**

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multi relational Data Mining, Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

**TEXT BOOKS**:

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.

**REFERENCES**:

1. Data Mining Techniques, Arun KPujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory& Dennis Murray Pearson EdnAsia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar,V.Ajay, PHI,2008.

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| **3** | **1** | **0** | **3** |
|  **15A05604** | **DESIGN AND ANALYSIS OF ALGORITHMS** |

**Course Objectives:**

* To know the importance of the complexity of a given algorithm.
* To study various algorithm design techniques.
* To utilize data structures and/or algorithmic design techniques in solving new problems.
* To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete.
* To study some techniques for solving hard problems.

**Course Outcomes:**

* Analyze the complexity of the algorithms
* Use techniques divide and conquer, greedy, dynamic programming, backtracking, branch and bound to solve the problems.
* Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
* Able to prove that a certain problem is NP-Complete.

**UNIT I**

**Introduction**: What is an Algorithm, Algorithm specification, Performance analysis.

**Divide and Conquer:** General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection sort, Stressen‘s matrix multiplication.

**UNIT II**

**Greedy Method**: General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.

**Dynamic programming:** General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, The traveling sales person problem.

**UNIT III**

**Basic Traversal and Search Techniques**: Techniques for binary trees, Techniques for Graphs,

Connected components and Spanning trees, Bi-connected components and DFS

**Back tracking:** General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

**UNIT IV**

**Branch and Bound:** The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency

Considerations.

**Lower Bound Theory**: Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

**UNIT V**

**NP – Hard and NP – Complete Problems:** NP Hardness, NP Completeness, Consequences of beingin P, Cook‘s Theorem, Reduction Source Problems, Reductions: Reductions for some known problems

**Text Books:**

1. “Fundamentals of Computer Algorithms”, Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2nd edition, University Press.2014,
2. “Design and Analysis of Algorithms”, Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, Second Edition, 2009.

**Reference Books:**

1. “Introduction to Algorithms”, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. “Introduction to Design and Analysis of Algorithms A strategic approach”, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. “Data structures and Algorithm Analysis in C++”, Allen Weiss, Second edition, Pearson education.
4. “Design and Analysis of algorithms”, Aho, Ullman and Hopcroft,Pearson education.
5. “Algorithms” – Richard Johnson baugh and Marcus Schaefer, Pearson Education

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| **3** | **1** | **0** | **3** |
| **15A05506** |  **INTRODUCTION TO BIG DATA** **(MOOCS-I)** |

**Course Objectives:**

* To understand Big Data Analytics for different systems like Hadoop.
* To learn the design of Hadoop File System.
* To learn how to analyze Big Data using different tools.
* To understand the importance of Big Data in comparison with traditional databases.

**Course Outcomes:**

* To gain knowledge about working of Hadoop File System.
* Ability to analyze Big Data using different tools.

**Unit-1:** Distributed programming using JAVA: Quick Recap and advanced Java Programming: Generics, Threads, Sockets, Simple client server Programming using JAVA, Difficulties in developing distributed programs for large scale clusters and introduction to cloud computing.

**Unit-2:** Distributed File systems leading to Hadoop file system, introduction, Using HDFS, Hadoop Architecture, Internals of Hadoop File Systems.

**Unit-3:** Map-Reduce Programming: Developing Distributed Programs and issues, why map- reduce and conceptual understanding of Map-Reduce programming, Developing Map-Reduce programs in Java, setting up the cluster with HDFS and understanding how Map- Reduce works on HDFS, Running simple word count Map-Reduce program on the cluster, Additional examples of M-R Programming.

**Unit-4:** Anatomy of Map-Reduce Jobs: Understanding how Map- Reduce program works, tuning Map-Reduce jobs, Understanding different logs produced by Map-Reduce jobs and debugging the Map- Reduce jobs.

**Unit-5:** Case studies of Big Data analytics using Map-Reduce programming: K-Means clustering, using Big Data analytics libraries using Mahout.

**Text Books:**

1. JAVA in a Nutshell 4th Edition.

2. Hadoop: The definitive Guide by Tom White, 3rd Edition, O'reily.

**References:**

1. Hadoop in Action by Chuck Lam, Manning Publications.

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| **3** | **1** | **0** | **3** |
| **15A04702** | **EMBEDDED SYSTEMS** **(MOOCS-I)**  |

**Course Objectives:**

• To understand the fundamental concepts of Embedded systems.

• To learn the kernel of RTOS, architecture of ARM processor.

**Course Outcomes:**

**After completion the students will be able to**

* Design of embedded systems leading to 32-bit application development.
* Understand hardware-interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.
* Review and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world.
* Understand Embedded Networking and IoT concepts based upon connected MCUs

**UNIT-I Introduction to Embedded Systems**

Embedded system introduction, host and target concept, embedded applications, features and architecture considerations for embedded systems- ROM, RAM, timers; data and address bus concept, Embedded Processor and their types, Memory types, overview of design process of embedded systems, programming languages and tools for embedded design

**UNIT-II: Embedded processor architecture**

CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture. Introduction to ARM architecture and Cortex – M series, Introduction to the TM4C family viz. TM4C123x & TM4C129x and its targeted applications. TM4C block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

**UNIT- III Overview of Microcontroller and Embedded Systems**

Embedded hardware and various building blocks, Processor Selection for an Embedded System , Interfacing Processor, Memories and I/O Devices, I/O Devices and I/O interfacing concepts, Timer and Counting Devices, Serial Communication and Advanced I/O, Buses between the Networked Multiple Devices.

Embedded System Design and Co-design Issues in System Development Process, Design Cycle in the Development Phase for an Embedded System, Uses of Target System or its Emulator and In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System

Design metrics of embedded systems - low power, high performance, engineering cost, time-to-market.

**UNIT-IV Microcontroller fundamentals for basic programming**

I/O pin multiplexing, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer, need of low power for embedded systems, System Clocks and control, Hibernation Module on TM4C, Active vs Standby current consumption. Introduction to Interrupts, Interrupt vector table, interrupt programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

**Unit-V Embedded communications protocols and Internet of things** Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, Implementing and programming UART, SPI and I2C, SPI interface using TM4C. Case Study: Tiva based embedded system application using the interface protocols for communication with external devices “Sensor Hub BoosterPack”

Embedded Networking fundamentals, IoT overview and architecture, Overview of wireless sensor networks and design examples. Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless and Networking applications Building IoT applications using CC3100 user API.

Case Study: Tiva based Embedded Networking Application: “Smart Plug with Remote Disconnect and Wi-Fi Connectivity”

**Text Books:**

1. Embedded Systems: Real-Time Interfacing to ARM Cortex-M Microcontrollers, 2014, Create space publications ISBN: 978-1463590154.
2. Embedded Systems: Introduction to ARM Cortex - M Microcontrollers, 5th edition

Jonathan W Valvano, Createspace publications ISBN-13: 978-1477508992

1. Embedded Systems 2E Raj Kamal, Tata McGraw-Hill Education, 2011 ISBN-0070667640, 9780070667648

**References:**

1. http://processors.wiki.ti.com/index.php/Hands-On\_Training\_for\_TI\_Embedded\_Processors
2. http://processors.wiki.ti.com/index.php/MCU\_Day\_Internet\_of\_Things\_2013\_Workshop
3. http://www.ti.com/ww/en/simplelink\_embedded\_wi-fi/home.html
4. CC3100/CC3200 SimpleLink™ Wi-Fi® Internet-on-a-Chip User Guide Texas Instruments Literature Number: SWRU368A April 2014–Revised August 2015.

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| **3** | **1** | **0** | **3** |
| **15A12501** |  **COMPUTER ANIMATION** **(MOOCS-I)** |

**Course Objectives:**

* To understand the computer animation techniques
* To understand the fundamentals of animation languages

**Course Outcomes:**

* Ability to animate different objects and scenarios
* Ability to design algorithms for animations

**Unit I**

**Introduction:** Perception, the heritage of animation, animation production, a brief history of computer animation

**Technical Background:** The display pipeline, homogeneous coordinates and the transformation matrix, compounding transformations: Multiplying transformations matrices, basic transformations, representing an arbitrary orientation, extracting transformations from a matrix, description of transformations in the display pipeline, round off error considerations, orientation representations

 **Unit II**

**Interpolation and basic Techniques:**

The appropriate function, controlling the motion along a curve, interpolation of rotations represented by quaternions, path following, key frame systems, animation languages, deforming objects

**Unit III**

**Interpolation and basic Techniques**: Morphing (2D), 3D shape interpolation

**Advanced Algorithms:** Automatic camera control,hierarchical kinematic modeling,Rigid body simulation, enforcing soft and hard constraints, controlling groups of objects, implicit surfaces

**Unit IV**

**Natural Phenomena:** Plants, water, gaseous phenomena

**Unit – V**

**Modeling and animating articulated figures:** Reaching and grasping**,** walking, facial animation, overview of virtual human representation, layered approach to human figure modeling, cloth and clothing, motion capture

**Text Books:**

1. “Computer Animation Algorithms and Techniques” by Rick Parent, 3rd Edition, Morgan Kaufmann Publishers.

**References:**

1. Principles of Three-Dimensional Computer Animation, 3rd ed, Michael O'Rourke
2. The Art of 3-D : Computer Animation and Imaging, 3rd ed., Isaac Victor Kerlow, Wiley, 2000.
3. The Computer Animator's Technical Handbook, Lynn Pocock and Judson Rosenbush, Morgan Kaufmann, 2002.
4. Real-Time Rendering, by Tomas Akenine-Möller and Eric Haines

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| **15A12502**  | **UML AND COMPUTER NETWORKS LABORATORY** |

**PART A (Computer Networks):**

**Course Objectives:**

* Understand the Design and implementation of a computer network
* Understand the limitations of existing protocols and scope for further improvement
* Understand the working of computer network and Internet.

**Course Outcomes:**

* Design and build computer networks and Internet applications
* Implement the algorithms studied in computer networks
* Do projects on open issues of computer network
* Motivate themselves for higher learning in computer networks specialization

**List of Experiments**

**Part A: Computer Networks**

1. Submit a report on the computer network facility available in the college including the devices used, topology used, specification of all the equipment used etc.
2. Submit a report on the Internet facility available in the college including the specification of the devices used and logical configuration of the devices.
3. Implement the algorithm for parity method for error control.
4. Implement the algorithm on hamming method for error correction (both single and block errors).
5. Implement the algorithm for check sum computation.
6. Implement the shortest path routing algorithm.
7. Graphically simulate the bit stuffing algorithm.
8. Implement the distance vector routing algorithm.
9. Implement the link state routing algorithm.
10. Study any simulator available in the market and submit a report containing executive summary of it and detail description of the features.
11. Browse the website ietf.org. Submit a report on the Internet standardization process. List the RFC documents and classify them based on some criteria.
12. Submit a report on the cable types used in Data communication and Telephone communication.
13. Consider the nslookup tool supported by the operating system, experiment with it and document its features.

**PART B (UML)**

**Course Objectives:**

* Practice the notation for representing various UML diagrams
* Analyze and design the problem by representing using UML diagrams
* Become familiar with all phases of OOAD.

**Course Outcomes:**

* Find solutions to the problems using object oriented approach
* Represent using UML notation and interact with the customer to refine the UML diagrams

The Lab is not just about using UML notation. The analysis and design part has to be given importance. Students have to analyze, design and model the following using UML notation. Students have to describe the problem in their own words, identify the classes, and their collaboration in solving the problem. Give proper justification for selection. Student has to draw the following diagrams using UML notation.

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.

**Problems that may be considered are**

1. College information system
2. Hostel management
3. ATM system

**Text Books:**

1)CCNA Study Guide by Cannon, Caudle, chiarella, Cengage Learning, Indian Edition.

2)“Object- Oriented Analysis And Design with Applications”, Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, PEARSON, 3rd edition, 2013.

3) “The Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh, Ivar Jacobson, PEARSON 12th Impression, 2012.

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|  **15A05610** | **DATA WAREHOUSING & MINING LABORATORY** |

**Course Objectives:**

Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration and Pentaho Business Analytics), Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA), Understand the data sets and data preprocessing, Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression, Exercise the data mining techniques with varied input values for different parameters.

**Course Outcomes:**

* Ability to build Data Warehouse and Explore WEKA
* Ability to perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
* Ability to perform classification, clustering and regression on data sets
* Ability to design data mining algorithms

**Data Warehousing**

**Experiments:**

**Build Data Warehouse and Explore WEKA**

1. Build a Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration tool, Pentoaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects, etc.).
	1. Identify source tables and populate sample data
	2. Design multi-dimensional data models namely Star, snowflake and Fact constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, Manufacturing, Automobile, etc.).
	3. Write ETL scripts and implement using data warehouse tools
	4. Perform various OLAP operations such slice, dice, roll up, drill up and pivot
	5. Explore visualization features of the tool for analysis like identifying trends etc.
2. Explore WEKA Data Mining/Machine Learning Toolkit
	1. Downloading and/or installation of WEKA data mining toolkit,
	2. Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
	3. Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel)
	4. Study the arff file format
	5. Explore the available data sets in WEKA.
	6. Load a data set (ex. Weather dataset, Iris dataset, etc.)
	7. Load each dataset and observe the following:
		1. List the attribute names and they types
		2. Number of records in each dataset
		3. Identify the class attribute (if any)
		4. Plot Histogram
		5. Determine the number of records for each class.
		6. Visualize the data in various dimensions

**Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets**

1. Explore various options available in Weka for preprocessing data and apply (like Discretization Filters, Resample filter, etc.) on each dataset
2. Load each dataset into Weka and run Aprori algorithm with different support and confidence values. Study the rules generated.
3. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. Derive interesting insights and observe the effect of discretization in the rule generation process.

**Demonstrate performing classification on data sets**

1. Load each dataset into Weka and run Id3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic.
2. Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix and derive Accuracy, F-measure, TPrate, FPrate, Precision and Recall values. Apply cross-validation strategy with various fold levels and compare the accuracy results.
3. Load each dataset into Weka and perform Naïve-bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
4. Plot RoC Curves
5. Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

**Demonstrate performing clustering on data sets**

1. Load each dataset into Weka and run simple k-means clustering algorithm with different values of k (number of desired clusters)**.** Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
2. Explore other clustering techniques available in Weka.
3. Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explain.

**Demonstrate performing Regression on data sets**

1. Load each dataset into Weka and build Linear Regression model. Study the clusters formed. Use Training set option. Interpret the regression model and derive patterns and conclusions from the regression results.
2. Use options cross-validation and percentage split and repeat running the Linear Regression Model. Observe the results and derive meaningful results.
3. Explore Simple linear regression technique that only looks at one variable

**Resource Sites:**

1. **http://www.pentaho.com/**
2. **http://www.cs.waikato.ac.nz/ml/weka/**

**Data Mining**

Task 1: Credit Risk Assessment

**Description:**

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need is some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

**The German Credit Data**:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. [credit dataset (original)](file:///G%3A%5CData%20Mining%5CML_MSIT%5Cprojects%5Cdatasets%5Ccredit-g.arff) Excel [spreadsheet](file:///G%3A%5CData%20Mining%5CML_MSIT%5Cprojects%5Cdatasets%5Ccredit-g2.xls) version of the German credit data.
In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset

* DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
* Owns\_telephone. German phone rates are much higher. So fewer people own telephones.
* Foreign\_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents.
* There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

**Subtasks: (Turn in your answers to the following tasks)**

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.

2. What attributes do you think might be crucial in making the credit assessment ? Come up with some simple rules in plain English using your selected attributes.

3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.

4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?

5. Is testing on the training set as you did above a good idea? Why or Why not ?

6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?

7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect?

8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)

9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifcations equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?

11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

12.(Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset ? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

**Task Resources:**

* [Andrew Moore's Data Mining Tutorials](file:///G%3A%5Cwww-2.cs.cmu.edu%5C_257Eawm%5Ctutorials%5Cdefault.htm) (See tutorials on Decision Trees and Cross Validation)
* [Decision Trees](file:///G%3A%5CData%20Mining%5CML_MSIT%5Cresources%5CDecsionTrees.pdf) (Source: Tan, MSU)
* [Tom Mitchell's book slides](file:///G%3A%5Cwww-2.cs.cmu.edu%5C_257Etom%5Cmlbook-chapter-slides.html) (See slides on Concept Learning and Decision Trees)
* Weka resources:
	+ [Introduction to Weka](file:///G%3A%5Cwww.cs.waikato.ac.nz%5C_257Eml%5Cweka%5Cweka_presentation%5Cweka.html) (html version) (download [ppt](file:///G%3A%5CData%20Mining%5CML_MSIT%5Cprojects%5Cresources%5Cweka.ppt) version)
	+ [Download Weka](file:///G%3A%5Cwww.cs.waikato.ac.nz%5C_257Eml%5Cweka%5Cdefault.htm)
	+ [Weka Tutorial](file:///G%3A%5CData%20Mining%5CML_MSIT%5Cresources%5CTutorial.pdf)
	+ [ARFF format](file:///G%3A%5Cwww.cs.waikato.ac.nz%5C_257Eml%5Cweka%5Carff.html)
	+ [Using Weka from command line](file:///G%3A%5Cwww.oefai.at%5C_257Ealexsee%5CWEKA%5Cdefault.htm)

Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table.

REMEMBER The following

Dimension

The dimension object (Dimension):

\_ Name

\_ Attributes (Levels) , with one primary key

\_ Hierarchies

One time dimension is must.

About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:

H1: YearL > QuarterL > MonthL > WeekL > DayL

H2: YearL > WeekL > DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

About Unique Key Constraints

When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consistig of Dimensions Patient, Medicine, Supplier, Time. Where measures are ‘ NO UNITS’, UNIT PRICE.

Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),

PATIENT (patient\_name, Age, Address, etc.,)

MEDICINE ( Medicine\_Brand\_name, Drug\_name, Supplier, no\_units, Uinit\_Price, etc.,)

SUPPLIER :( Supplier\_name, Medicine\_Brand\_name, Address, etc., )

If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.

Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

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|  **15A99501** | **SOCIAL VALUES & ETHICS (AUDIT COURSE)**  *(Common to all Branches)* |

**UNIT - I**

**Introduction and Basic Concepts of Society: Family and Society:** Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.

**Channels of Youth Moments for National Building:** **NSS & NCC:** History, philosophy, aims & objectives; Emblems, flags, mottos, songs, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries. **Nehru Yuva Kendra (NYK):**  Activities – Socio Cultural and Sports.

**UNIT – II**

Activities of NSS, NCC, NYK:

**Citizenship:** Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.

**Youth and Crime:** Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

**Social Harmony and National Integration:** Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

**UNIT – III**

**Environment Issues:** Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

**Health, Hygiene & Sanitation:** Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.

**Disaster Management:** Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.

 **Civil/ Self Defense:** Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,

**UNIT – IV**

**Gender Sensitization:** Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiates of NGOs – Awareness, Movements;

**UNIT - V**

**Physical Education :** Games & Sports: Health and Recreation – Biolagical basis of Physical activity – benefiets of exercise – Physical, Psychological, Social; Physiology of Musucular Activity, Respiration, Blood Circulation**.**

**Yoga:** Basics of Yoga – Yoga Protocol, Postures, Asanas, Pranayama: Introduction of Kriyas, Bandhas and Mudras.

**TEXT BOOKS:**

1. NSS MANUAL

2. SOCIETY AND ENVIRONMENT: A.S.Chauha, Jain Brothers Publications,

 6th Edition, 2006

3. INDIAN SOCIAL PROBLEM: G.R.Madan, Asian Publisher House

4. INDIAN SOCIAL PROBLEM: Ram Ahuja, Rawat Publications

5. HUMAN SOCIETY: Kingsley Davis, Macmillan

6. SOCIETY: Mac Iver D Page, Macmillan

7. SOCIOLOGY – THEMES AND PERSPECTIVES: Michael Honalambos,

 Oxford University Press

8. CONSTITUTION OF INDIA: D.D.Basu, Lexis Nexis Butterworth Publishers

9. National Youth Policy 2014 (available on [www.yas.nic.in](http://www.yas.nic.in))

10.TOWARS A WORLD OF EQUALS: A.Suneetha, Uma Bhrugudanda, Duggirala

 Vasantha, Rama Melkote, Vasudha Nagraj, Asma Rasheed, Gogu Shyamala,

 Deepa Streenivas and Susie Tharu

11. LIGHT ON YOGA : B.K.S.Iyengar, Penguin Random House Publishers

[www.un.org](http://www.un.org)

[www.india.gov.in](http://www.india.gov.in)

[www.yas.nic.in](http://www.yas.nic.in)

<http://www.who.int/countries/ind/en/>

<http://www.ndma.gov.in>

<http://ayush.gov.in/event/common-yoga-protocol-2016-0>

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| **15A05505** |  **SOFTWARE TESTING** |

**Course Objectives:**

* Fundamentals for various testing methodologies.
* Describe the principles and procedures for designing test cases.
* Provide supports to debugging methods.
* Acts as the reference for software testing techniques and strategies.

**Course Outcomes:**

* Understand the basic testing procedures.
* Able to support in generating test cases and test suites.
* Able to test the applications manually by applying different testing methods and automation tools.
* Apply tools to resolve the problems in Real time environment.

**UNIT I**

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs.

**Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

**UNIT II**

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application ofDataflow Testing.

**UNIT III**

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

**UNIT IV**

**Paths, Path products and Regular expressions:** Path Products & Path Expression, ReductionProcedure, Applications, Regular Expressions & Flow Anomaly Detection.

**Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

**UNIT V:**

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, StateTesting, Testability Tips.

**Graph Matrices and Application**: Motivational Overview, Matrix of Graph, Relations, Power of aMatrix, Node Reduction Algorithm, Building Tools.

**Text Books:**

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.

**Reference Books :**

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing- Yogesh Singh, Camebridge
3. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
4. Software Testing, N.Chauhan, Oxford University Press.
5. Introduction to Software Testing, P.Ammann & J.Offutt, Cambridge Univ. Press.
6. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
7. Software Testing Concepts and Tools, P.Nageswara Rao, dreamtech Press
8. Win Runner in simple steps by Hakeem Shittu,2007 Genixpress.
9. Foundations of Software Testing, D.Graham & Others, Cengage Learning.

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| **15A05702** | **INFORMATION SECURITY** |

**Course Objectives:**

* Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer network security
* Identifying the suitable points for applying security features for network traffic
* Understanding the various cryptographic algorithms and implementation of the same at software level
* Understanding the various attacks, security mechanisms and services

**Course Outcomes:**

* Protect the network from both internal and external attacks
* Design of new security approaches
* Ability to choose the appropriate security algorithm based on the requirements.

**Unit-I**

Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security

Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography.

Modern Block Ciphers: Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4.

**Unit-II**

Introduction to Number theory – Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures, GF(2n) Fields, Primes, Primality Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.

Public-key cryptography - Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ELGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

**Unit-III**

Cryptographic Hash functions: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)

Message Authentication Codes: Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption

Digital Signatures-RSA with SHA & DSS

**Unit-IV**

Key Management and distribution: Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure.

User Authentication: Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management, Electronic mail security: Pretty Good Privacy (PGP), S/MIME.

**Unit-V**

Security at the Transport Layer(SSL and TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH

Security at the Network layer (IPSec): Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.

System Security: Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls

**Text books:**

1. “Cryptography and Network Security”, Behrouz A. Frouzan and Debdeep

 Mukhopadhyay, Mc Graw Hill Education, 2nd edition, 2013.

2.“Cryptography and Network Security: Principals and Practice”, William Stallings,

 Pearson Education , Fifth Edition, 2013.

**References:**

1. “Network Security and Cryptography”, Bernard Menezes , Cengage Learning.

2. “Cryptography and Security”, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.

3. “Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.

4. “Cryptography and Network Security”, Atul Kahate, TMH.

5. ‘Introduction to Cryptography”, Buchmann, Springer.

6. ‘Number Theory in the Spirit of Ramanujan”, Bruce C.Berndt, University Press

7. “Introduction to Analytic Number Theory”, Tom M.Apostol, University Press

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| **15A12601** | **WEB TECHNOLOGIES** |

**Course Objectives:**

* Learn the fundamentals of HTML and JavaScript
* Learn to communicate over a network using java
* Learn do design server side programs and access them from client side

**Course Outcomes:**

* Ability to design websites and do client side validations
* Share information over a network
* Ability to write server side programs

**Unit I**

**Fundamentals:** Introduction to the Web, Web servers and Clients, Resources, URL and its Anatomy, Message Format, Persistent and Non-persistent connections, Web Caching, Proxy, Java and the Net, Java Network Classes and Interfaces, Looking up Internet Address, Client/Server programs, Socket programming, e-mail client, POP3 programs, Remote method invocation, Example.

**Unit II**

**HTML**: HTML and its Flavors, HTML basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images, Meta tag, Planning of Web page, Model and Structure for a Website, Designing Web pages, Multimedia content.

**Cascading style sheets**: Advantages, Adding CSS, Browser compatibility, CSS and page layout, Selectors.

**Unit III**

**JavaScript**: Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects, Events, Event handlers, Multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms, DHTML with javascript.

**Unit IV**

**Server side programming:** Internet programming paradigm, Sever-side programming, Languages for CGI, Applications, Server environment, Environment variables, CGI building blocks,CGI scripting using C, Shell script, Writing CGI program, CGI security, Alternatives and Enhancement to CGI, Server-side Java, Advantages over Applets, Servlet alternatives, Servlet strengths, Servlet architecture, Servlet life cycle, Generic and HTTP Servelet, First servlet, Passing parameters to servlets, Retrieving parameters, Server-side include, Cookies, Fileters, Problems with servlet, Security issues, JSP and HTTP, JSP Engines, How JSP works, JSP and Servlet, Anatomy of a JSP page, JSP syntax, JSP components.

**Unit – V**

**Sever side programming: continued:** Beans, Session tracking, Users passing control and data between pages, Sharing session and Application data, Database connectivity, JDBC drivers, Basic steps, Loading a driver, Making a connection, Execute and SQL statement, SQL statements, Retrieving the result, Getting database information, Scrollable and updatable resultset, Result set metadata, Introduction to JavaBeans, Bean builder, Advantages of Java Beans, BDK introspection, Properties, BeanInfo interface, Persistence, Customizer, JavaBeans API, EJB, Introduction to Structs Framework.

**Text Books:**

1. “Web Technologies”, Uttam K. Roy, , Oxford Higher Education., 1st edition, 10th impression, 2015

**References**

1. “Java How to program”, Paul deitel, Harvey deital, PHI
2. “Introduction to Java Programming”, Y.Daniel Liang, 6th Edition, Pearson Education, 2007
3. “The J2EE Tutorial”, Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004.
4. “Web Technologies”, Roy, Oxford University Press
5. “Web Technologies” Srinivasan, Pearson Education, 2012
6. “Java EE 5 for Beginners”, Ivan Bayross, Sharanam Shah, Cynthia Bayrossand Vaishali shai,SPD.
7. “Programming the Worldwide Web”, Robert W.Sebesta, 7th edition, 2009, Pearson Education.

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| **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR** |
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|  **15A05601** |  **COMPILER DESIGN** |

**Course Objectives:**

This course is a *de facto* capstone course in Computer Science, as it combines skills in software design, programming, data structures and algorithms, theory of computing, documentation, and machine architecture to produce a functional compiler.

* Realize that computing science theory can be used as the basis for real applications
* Introduce the major concept areas of language translation and compiler design.
* Learn how a compiler works
* Know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications
* Know the importance of optimization and learn how to write programs that execute faster

**Course Outcomes:**

* Able to design a compiler for a simple programming language
* Able to use the tools related to compiler design effectively and efficiently
* Ability to write optimized code

**Unit - I**

**Introduction:** Language processors, The Structure of a Compiler, the science of building a complier

**Lexical Analysis**: The Role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, The lexical analyzer generator Lex, Design of a Lexical Analyzer generator

**Unit II**

**Syntax Analysis**: Introduction, Context Free Grammars, Writing a grammar, TOP Down Parsing**,**

Bottom Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using ambiguous grammars, Parser Generators

**UNIT III**

**Syntax Directed Translation:** Syntax Directed Definitions, Evaluation orders for SDD’s, Application of SDT, SDT schemes, Implementing L-attribute SDD’s.

**Intermediate Code Generation:** Variants of syntax trees, three address code, Types and declarations, Translations of expressions, Type checking, control flow statements, backpatching, switch statements, intermediate code for procedure.

**UNIT IV**

**Run Time Environment :** storage organization, , Stack allocation of space, Access to non-local data on stack , Heap management

**Symbol Table:** Introduction, symbol table entries, operations on the symbol table, symbol table organizations, non block structured language, block structured language.

**UNIT V**

**Code Generation:** Issues in the design of a code generator, The Target language, Basic blocks and flow graphs, optimization of basic blocks, a simple code generator, register allocation and assignment, optimal code generation for expressions, dynamic programming code generation.

**Code Optimization**: Introduction, where and how to optimize, principle source of optimization, function preserving transformations, loop optimizations, global flow analysis, machine dependent optimization

**Text Books :**

1. “Compilers Principles, Techniques and Tools”, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman., Pearson,2014.
2. “Compiler Construction”, K.V.N Sunitha, Pearson, 2013

Reference Books :

1. Compiler Design”, K. Muneeswaran., Oxford University Press, 2012
2. “Engineering A Compiler”, Second Edition, Keith D. Cooper & Linda Torczon., MK(Morgan Kaufmann) (ELSEVIER)
3. “Compilers Principles and Practice”, Parag H. Dave, Himanshu B. Dave.,PEARSON
4. “Compiler Design”, SandeepSaxena, Rajkumar Singh Rathore., S.Chand publications
5. “Compiler Design”, SantanuChattopadhyay., PHI
6. “Principals of Compiler Design”, Nadhni Prasad, Elsevier

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| **15A12602** | **CLOUD COMPUTING** |

**Course Objectives:**

* To explain the evolving computer model called cloud computing.
* To introduce the various levels of services that can be achieved by cloud.
* To describe the security aspects in cloud.

**Course Outcomes:**

* Ability to create cloud computing environment
* Ability to design applications for Cloud environment

**Unit-1**

**Introduction to cloud computing:** Introduction, Characteristics of cloud computing, Cloud Models, Cloud Services Examples, Cloud Based services and applications

**Cloud concepts and Technologies:** Virtualization, Load balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing.

**Cloud Services and Platforms :** Compute Services, Storage Services, Database Services, Application services, Content delivery services, Analytics Services, Deployment and Management Services, Identity & and Access Management services, Open Source Private Cloud software.

**Unit-2**

**Hadoop & MapReduce:** Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster setup.

**Cloud Application Design:** Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

**Python Basics** : Introduction, Installing Python, Python data Types & Data Structures, Control flow, Function, Modules, Packages, File handling, Date/Time Operations, Classes.

**Unit-3**

**Python for Cloud:** Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for MapReduce, Python packages of Interest, Python web Application Frame work, Designing a RESTful web API.

**Cloud Application Development in Python**: Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App.

**Unit-4**

**Big Data Analytics**: Introduction, Clustering Big Data, Classification of Big data, Recommendation of Systems.

**Multimedia Cloud: Introduction**, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Transcoding App.

**Cloud Application Benchmarking and Tuning:** Introduction, Workload Characteristics, Application Performance Metrics, Design Considerations for a Benchmarking Methodology, Benchmarking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study, Hadoop benchmarking case Study.

**Unit-5**

**Cloud Security:** Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity & Access Management, Data Security, Key Management, Auditing.

**Cloud for Industry, Healthcare & Education:** Cloud Computing for Healthcare, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

**Migrating into a Cloud:** Introduction, Broad Approaches to migrating into the cloud, the seven –step model of migration into a cloud.

**Organizational readiness and Change Management in The Cloud Age :** Introduction, Basic concepts of Organizational Readiness, Drivers for changes : A frame work to comprehend the competitive environment , common change management models, change management maturity models, Organizational readiness self – assessment.

**Legal Issues in Cloud Computing :** Introduction, Data Privacy and security Issues, cloud contracting models, Jurisdictional issues raised by virtualization and data location, commercial and business considerations , Special Topics

**Text Books:**

1. “Cloud computing A hands-on Approach” By ArshdeepBahga, Vijay Madisetti, Universities Press, 2016

2.”Cloud Computing Principles and Paradigms: By Raj kumar Buyya, James Broberg, Andrzej Goscinski, wiley, 2016

**References:**

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola,S Thamarai Selvi, TMH
2. Cloud computing A hands-On Approach by Arshdeep Bahga and Vijay Madisetti.
3. Cloud Computing : A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, TataMcGraw Hill, rp2011.
4. Enterprise Cloud Computing, GautamShroff, Cambridge University Press, 2010.
5. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O’Reilly, SPD, rp2011.
6. Essentials of Cloud Computing by K. Chandrasekaran. CRC Press

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| **15A12603** | **IMAGE PROCESSING** **(CBCC-I)** |

**Course Objectives:**

* Develop an overview of the field of image processing.
* Understand the Image segmentation, enhancement, compression etc., approaches and how to implement them.
* Prepare to read the current image processing research literature.
* Gain experience in applying image processing algorithms to real problems

 **Course Outcomes:**

At the end of the course the students will be assessed to determine whether they are able to

* Analyze general terminology of digital image processing.
* Examine various types of images, intensity transformations and spatial filtering.
* Develop Fourier transform for image processing in frequency domain.
* Evaluate the methodologies for image segmentation, restoration, topology, etc.
* Implement image process and analysis algorithms.
* Apply image processing algorithms in practical applications

**UNIT I**

Digital Image Fundamentals: What is Digital Image Processing, examples of fields that use digital image processing, fundamental Steps in Digital Image Processing, Components of an Image processing system, Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations, Probabilistic Methods

**UNIT II**

Image Enhancement: Image Enhancement in the spatial domain: some basic gray level transformations, histogram processing, enhancement using arithmetic and logic operations, basics of spatial filters, smoothening and sharpening spatial filters, combining spatial enhancement methods. Image enhancement in the frequency domain: introduction to Fourier transform and the frequency domain, smoothing and sharpening frequency domain filters, homomorphic filtering.

**UNIT III**

Segmentation: Thresholding, Edge Based Segmentation: Edge Image Thresholding, Region Based Segmentation, Matching, Shape Representation and Description: Region Identification, Contour Based Shape, Representation and Description

**UNIT IV**

Image Compression: Fundamentals, image compression models, elements of information theory, error-free compression, lossy compression, Shape representation: region identification, contour-based shape representation and description, region based shape representation and description.

**UNIT V**

Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit transformation, basic morphologic algorithms. Color Image Processing: Color fundamentals, Color Models and basics of full-color image processing

**Text Books :**

1. Digital Image Processing, Rafael C.Gonzalez and Richard E. Woods, Third Edition, Pearson

Education, 2007

2. Digital Image Processing, S.Sridhar, Oxford University Press

**Reference Books :**

1. Fundamentals of Digital Image Processing, S. Annadurai, Pearson Edun, 2001.

2. Digital Image Processing and Analysis, B. Chanda and D. Dutta Majumdar, PHI, 2003.

3. Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle,2nd Edition, Thomson Learning, 2001.

4. Digital Image Processing, Vipula Singh, Elsevier

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|  **15A05608** | **SYSTEM APPLICATIONS & PRODUCT (SAP)**  **(CBCC-I)** |

**Course Objectives:**

1. Understand the role of enterprise systems in supporting business processes.

2. Identify key integration points between financial accounting and other processes.

3. Understand the role of the credit management process in fulfillment.

4. Analyze the key concepts associated with material planning.

**Course Outcomes:**

1. Adopt and apply an integrated perspective to business processes

2. Effectively use SAP® ERP to execute the key steps in the procurement process.

3. Ability to use SAP ERP to extract meaningful information about the production

 process.

4. Extract and evaluate meaningful information about the material planning process

 using the SAP ERP system.

**Unit 1:**

**Introduction to Business Processes:** The Functional Organizational Structure, Business Processes, Global Bike Incorporated (GBI).  **Introduction to Enterprise Systems:** Enterprise Systems, Data in an Enterprise System, Reporting. **Introduction to Accounting:** Organizational Data, Master Data, Key Concepts, Processes, Reporting.

**Unit 2:**

**The Procurement Process:** Organizational Data, Master Data, Key Concepts, Process, Reporting.

**Unit 3:**

**The Fulfillment Process:** Organizational Data, Master Data, Process, Credit Management Process, Reporting.

**Unit 4:**

**The Production Process:** Master Data, Process, Reporting. **Inventory and Warehouse Management Processes:** Inventory Management, Organizational Data in warehouse Management, Master Data in Warehouse Management, Processes in Warehouse Management, Reporting.

**Unit 5:**

**The Material Planning Process:** Master Data, Process, Reporting, **Process Integration:** Procurement, Fulfillment, and IWM Processes, Procurement, Fulfillment, Production, and IWM Processes.

**Text Book:**

1. “Integrated Business Processes with ERP systems” Simha R.Magal, Jeffery word, JOHN WILEY & SON S, INC.

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|  **15A01608** | **INTELLECTUAL PROPERTY RIGHTS** **(CBCC– I)** |

**Course Objectives:**

*This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations.*

**Course Outcomes:**

*On completion of this course, the student will have an understanding of the following:*

1. *Intellectual Property Rights and what they mean*
2. *Trade Marks and Patents and how to register them*
3. *Laws Protecting the Trade Marks and Patents*
4. *Copy Right and laws related to it.*

UNIT – I

Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

UNIT – II

Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III

Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law.

Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT – IV

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation.

Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

UNIT – V

New Developments Of Intellectual Property: New Developments In Trade Mark Law ; Copy Right Law, Patent Law, Intellectual Property Audits.

International Overview On Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development In Trade Secrets Law.

TEXT BOOKS & REFERENCES:

1. Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learing.

2. Intellectual Property Rights– Unleashmy The Knowledge Economy, Prabuddha

 Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,

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|  **15A12604** | **SOFTWARE TESTING LABORATORY** |

**Course Objectives:**

To learn to use the following (or Similar) automated testing tools to automate testing:

* Win Runner/QTP for functional testing.
* Load Runner for Load/Stress testing.
* Test Director for test management.
* JUnit, HTMLUnit, CPPUnit.
* To study state-of-art tools for software testing and Middleware technologies

**Course Outcomes:**

* Test the software applications using standard tools available in the market

 **Sample problems on testing:**

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

1. “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.
2. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
3. Write the test cases for any known application (e.g. Banking application)
4. Create a test plan document for any application (e.g. Library Management System)
5. Study of any testing tool (e.g. Win runner)
6. Study of any web testing tool (e.g. Selenium)
7. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
8. Study of any test management tool (e.g. Test Director)
9. Study of any open source-testing tool (e.g. Test Link)
10. 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.

**Additional problems on testing:**

1. Test the following using JUnit and CPPUnit:

 i)Sorting problems ii)Searching problems iii)Finding gcd of two integers

 iv) Findingfactorial of a number.

 2. Test web based forms using HTMLUnit.

 3. Test database stored procedures using SQLUnit.

 (Use sufficient number of test cases in solving above Problems)

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

**REFERENCE BOOKS:**

1. Software Testing Concepts and Tools,P.Nageswara Rao,dreamtech press.
2. Software Testing Tools,Dr.K.V.K.K.Prasad,dreamtech Press.
3. Software Testing with Visual Studio Team System 2008, S.Subashini, N.Satheesh kumar,SPD.
4. Learning UML 2.0,Russ Miles and Kim Hamilton,O’Reilly,SPD.
5. Mastering UML with Rational Rose,W.Boggs&M.Boggs,Wiley India.

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| **15A12605**  | **WEB TECHNOLOGIES LABORATORY** |

**Course Objectives:**

* Learn the fundamentals of HTML and JavaScript
* Learn to communicate over a network using java
* Learn do design server side programs and access them from client side

**Course Outcomes:**

* Ability to design websites and do client side validations
* Share information over a network
* Ability to write server side programs
1. Write a Java program which stores the user login information in database in a server, creates user interface for inserting, deleting, retrieving information from the database, accepts user login information and verifies it.
2. Write a JAVA program which establishes a connection between client and server and transfers data. Transfer the data without establishing the connection.
3. Write a Java Program to create an Employee class with the data members Emp\_id, name, Department and create a member function to get the employee information, display the details.
4. Write a java program to create a package for simple arithmetic operations
5. Write a Java Program to create a user defined Exception called ―StringNotMatchException‖ when the user entered input is not equal to ―INDIA‖
6. Write a HTML to create user registration form with following constraints; Validate the registration, user login, user profile and payment by credit card pages using Java Script
7. Create and save an XML document at the server, which contains 10 users information. Write a program which takes User ID as input and returns the user details by taking the user information from the XML document.
8. Write a XHTML form for Employee Information like Emp\_id, Name, Department Name, Phone, E-mail. using java script check the validation for each Fields(The First Character of Emp\_id character followed by number, name should accept 20 characters, phone max 8 digits, email)
9. Write a Java Servlet Program to display the Current time on the server.
10. To write html and servlet to demonstrate invoking a servlet from a html
11. Write a Java servlet program to change the Background color of the page by the color selected by the user from the list box.
12. Write a Java servlet to get the personal details about the user(Like name, Address, City, Age, Email id) and check whether the user is Eligible to vote or not.
13. Write a Java servlet Program to create a Cookie and keep it alive on the client for 30 minutes.
14. Write a java servlet program to display the various client information like Connection, Host, Accept-Encoding, User Agent.
15. To write java servlet programs to conduct online examination and to display student mark list available in a database
16. Write a Java servlet Program to implement the Book Information using JDBC
17. Write a Java Servlet Program to create a Session and display the various information like, Last accessed time, Modified time, Expiration)
18. Write a JSP Program to Display the number of visitors visited the page.
19. Write a JSP Program to implement the Book Information using Database.
20. Write a JSP Program to implement the Telephone Directory

**References**

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill
3. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dreamtech
4. Java Server Pages –Hans Bergsten, SPD O‟Reilly
5. Java Script, D.Flanagan, O‟Reilly, SPD.
6. Beginning Web Programming-Jon Duckett WROX.
7. Programming World Wide Web, R.W.Sebesta, Fourth Edition, Pearson.
8. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson

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|  **15A52602** | **ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS**  **(AELCS) LAB (Audit Course)** |

**1. INTRODUCTION**

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:

* Gathering ideas and information and to organise ideas relevantly and coherently.
* Engaging in debates.
* Participating in group discussions.
* Facing interviews.
* Writing project/research reports/technical reports.
* Making oral presentations.
* Taking part in social and professional communication.

**2 OBJECTIVES:**

This Lab focuses on using multi-media instruction for language development to meet the following targets:

* To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
* Further, they would be required to communicate their ideas relevantly and coherently in writing.
* To prepare all the students for their placements.

**3. SYLLABUS**:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

**UNIT-I: COMMUNICATION SKILLS**

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

**UNIT-II: WRITING SKILLS**

1. Report writing
2. Resume Preparation
3. E-mail Writing

**UNIT-III: PRESENTATION SKILLS**

1. Oral presentation
2. Power point presentation
3. Poster presentation

**UNIT-IV: GETTING READY FOR JOB**

1. Debates
2. Group discussions
3. Job Interviews

**UNIT-V: INTERPERSONAL SKILLS**

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

**4. LEARNING OUTCOMES:**

* Accomplishment of sound vocabulary and its proper use contextually
* Flair in Writing and felicity in written expression.
* Enhanced job prospects.
* Effective Speaking Abilities

**5. MINIMUM REQUIREMENT:**

 The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:

* Spacious room with appropriate acoustics.
* Round Tables with movable chairs
* Audio-visual aids
* LCD Projector
* Public Address system
* P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
* T. V, a digital stereo & Camcorder
* Headphones of High quality

**6. SUGGESTED SOFTWARE:**

The software consisting of the prescribed topics elaborated above should be procured and G

1. **Walden Infotech: Advanced English Communication Skills Lab**
2. **K-VAN SOLUTIONS-Advanced English Language Communication Skills lab**
3. **DELTA’s key to the Next Generation TOEFL Test: Advanced Skills Practice.**
4. **TOEFL & GRE**( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. **Train2success.com**

**7. BOOKS RECOMMENDED:**

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 3rd Edn. 2015.
3. **Essay Writing for Exams, Audrone Raskauskiene, Irena Ragaisience & Ramute Zemaitience,OUP, 2016**
4. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
5. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. **Campus to Corporate,** Gangadhar Joshi, Sage Publications, 2015
7. **Communicative English,**E Suresh Kumar & P.Sreehari, Orient Blackswan, 2009.
8. **English for Success in Competitive Exams,** Philip Sunil Solomon OUP, 2015

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| **15A52601** | **MANAGEMENT SCIENCE** |

***Course Objectives****: The objective of the course is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management****.***

**UNIT –I: Introduction to Management**: Concept-Nature and Importance of Management, Functions-Evaluation of Scientific Management, Modern management-Motivation Theories-Leadership Styles-Decision Making Process-Designing Organization Structure-Principles and Types of Organization.

**UNIT- II: Operations Management:** Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control-EOQ&ABC Analysis(Simple Problems)**Marketing Management:**

Meaning, Nature, Functions of Marketing, Marketing Mix, Channels of distribution-Advertisement and sales promotion-Marketing strategies-Product Life Cycle.

**UNIT -III: Human Resource Management (HRM):** Significant and Basic functions of HRM-Human Resource Planning(HRP), Job evaluation, Recruitment and Selection, Placement and Induction-Wage and Salary administration. Employee Training and development-Methods-Performance Appraisal-Employee Grievances-techniques of handling Grievances.

**UNIT –IV: Strategic Management:** Vision, Mission, Goals and Strategy- Corporate Planning Process-Environmental Scanning-SWOT analysis-Different Steps in Strateg Formulation, Implementation and Evaluation. **Project Management**: Network Analysis-PERT, CPM, Identifying Critical Path-Probability-Project Cost Analysis, Project Crashing (Simple Problems).

**UNIT-V: Contemporary Management Practices:** Basic concepts of MIS-Materials Requirement Planning(MRP),Just-In-Time(JIT)System, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models(CMM) evies, Supply Chain Management, Enterprise Resource Planning(ERP),Performance Management, Business Process Outsourcing(BPO), Business Process Re-Engineering and Bench Marking, Balance Score Card.

**Course Outcomes**: This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient management decisions on physical and human resources of an organization. Beside the knowledge of Management Science facilitates for his/her personal and professional development.

**TEXT BOOKS:**

1. A.R Aryasri: Management Science, TMH, 2013

2. Kumar /Rao/Chalill ‘Introduction to Management Science’ Cengage, Delhi, 2012.

**REFERENCE BOOKS:**

1. A.K.Gupta “Engineering Management”,S.CHAND, New Delhi, 2016.

2**.** Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.

3. Kotler Philip & Keller Kevin Lane: Marketing Mangement , PHI,2013.

5. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.

6. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.

7. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005

8. Parnell: Strategic Management, Biztantra, 2003.

9. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

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| **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR** |
| **B. Tech IV-I Sem. (IT)** | **L** | **T** | **P** | **C** |
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| **15A12701** | **INTERNET WORKING WITH TCP / IP** |

**Course Objectives:**

* To understand the concepts and techniques that have been used to design and implement the TCP/IP Internet
* To understand the issues that are driving the development of new protocols to broaden and enhance the operation of the Internet
* To understand stream control protocol, network management.
* To study various network protocols.

**Course Outcomes:**

* Ability to configure a network.
* Ability to remotely access other computers.
* Ability to upload and download files.

**Unit 1:**

**Stream Control Transmission Protocol (SCTP):**

Introduction, SCTP Services, SCTP Features, Packet Format, An SCTP Association, State Transition Diagram, Flow Control, Error Control, Congestion control

**Introduction to the application layer:**

Client server paradigm, Peer to peer paradigm

**Unit 2:**

**HOST Configuration (DHCP):** Introduction, DHCP operation, Configuration

**Remote Login: Telnet and SSH:** Telnet, secure shell

**Unit 3:**

**File Transfer: FTP and TFTP:** FTP, TFTP

**World Wide Web and HTTP**: Architecture, web documents, HTTP

**Electronic Mail: SMTP, POP, IMAP, and MIME**: Architecture, User Agent, Message Transfer Agent: SMTP, Message Access Agent: POP and IMAP, MIME, Web based mail, Email security

**Unit 4:**

**Network Management: SNMP:** Concept, Management components, SMI, MIB, SNMP, UDP Ports, Security

**Multimedia:** Introduction, digitizing audio and video, Audio and video compression, Streaming stored audio/video, Streaming Live audio/video, Real time interactive audio/video, RTP, RTCP, Voice over IP, Quality of service, Integrated services, Differentiated services

**Unit 5:**

**IPv6 Addressing**: Introduction, Address space allocation, Global unicast address, Auto configuration, Renumbering

**IPv6 Protocol**: Introduction, Packet format, Transition from IPv4 to IPv6

**ICMPv6:** Introduction, Error Messages, Informational Messages, Neighbor- Discovery Messages, Group Membership Messages.

**TEXT BOOKS:**

1. TCP/IP Protocol Suite, Behrouz A. Forouzan, 4th edition, TMH,2010

**REFERENCES**

 1. TCP/IP, Tittel Chappell, Cengage Learning.

2. TCP/IP Illustrated, Volume,1the Protocols, W. Richard Stevens, G. Gabrani, Pearson.

3. TCP/IP Application Layer Protocols for Embedded Systems, M.Tim Jones, Networking Series.

4. Internetworking With TCP/IP Volume 1: Principles Protocols, and Architecture, 5th edition,

 2006. ISBN 0,13,187671,6.

5. Internetworking With TCP/IP Volume II: Design, Implementation, and Internals (with D.

 Stevens), Third edition, 1999. ISBN 0,13,973843,6.

6. Internetworking With TCP/IP Volume III: Client,Server Programming and Applications,

 Linux/POSIX Socket Version (with D. Stevens), 2000. 0,13,032071,4.

7. Internetworking With TCP/IP Volume III: Client,Server Programming and Applications, BSD

 Socket Version (with D. Stevens), second edition 1996. 0,13,260969,X.

8. Internetworking With TCP/IP Volume III: Client,Server Programming and Applications,

 AT&T TLI Version (with D. Stevens), 1994. ISBN 0,13,474230,3.

9. Internetworking With TCP/IP Volume III: Client,Server Programming and Applications,

 Window Sockets Version (with D. Stevens), 1997. ISBN 0,13,848714,6.

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| **15A12702** | **SCRIPTING LANGUAGES** |
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**Course Objectives:**

The primary objective of the course is to learn web programming by designing and developing a web based project and also learn basic User Interface Principles.

**Course Outcomes:**

**At the end of the course, the student should be able to:**

* Ability to build interactive, data-driven sites and solve real time problems using PHP
* Ability to create dynamic web pages using the PHP scripting language and MySQL database.
* Understand the concepts of object-oriented programming as used in Python: classes, subclasses, inheritance, and overriding. Understand the basics of OO design.

**Unit-1**

**Essential PHP:** Enter PHP, Getting PHP, Creating your Development Environment, Creating and running first PHP page, Mixing HTML and PHP, Printing some Text, Using PHP “here” documents, command-line PHP, comments, variables, storing data, Interpolating Strings, creating variables and constants and data types.

**Operators and flow controls:** PHP’s Math Operators, working with the assignment operator, Increment and decrement values, String operators, Bitwise, Execution operator, Operator precedence, If statement, comparison operator, logical operators, else, elif, ternary, switch, for, while, do-while loops, foreach, terminating, skipping iterations.

**Strings and Arrays:** String Functions, Converting to and from Strings, Formatting Text Strings, Arrays, Array PHP Functions, Sorting Arrays, handling Multi dimensional arrays, splitting and merging arrays.

**Unit-2**

**Creating Functions:** Creating in Functions in PHP, Passing Functions some data, Passing Arrays to functions, Passing by reference, default arguments, returning data from functions, returning arrays and lists, variable scope in php, accessing global data, static variables, conditional functions, nesting functions, creating include files, returning errors from functions.

**Reading data in web Pages:** Setting up web pages to communicate with PHP, Handling of Text fields, Text areas, Check boxes, Radio buttons, List boxes, Password controls, Hidden controls, Image Maps, File Uploads, buttons.

**PHP browser Handling Power:** Using PHP’s Server Variables, HTTP Headers, User’s browser type, Redirecting browsers with HTTP Headers, Dumping a form’s data all at once, Handling form data with custom arrays, putting all it into the page, performing data validation, checking entered data, requiring numbers and text, Persisting user data, client side data validation, handling html tags in user input.

**Unit-3**

**Object Oriented Programming**: Creation of class and Objects, setting access to Properties and methods, Using constructors to Initialize Objects, using Destructors to clean up after objects, Inheritance, Method Overriding, overloading, autoloading classes .

**Advanced Object Oriented Programming**: Creating Static Methods, static members and Inheritance, abstract classes, interfaces, Supporting Object Iteration, Comparing Objects, creating class constants, final key word, cloning objects.

**Working with Database**: what is database?, Essential sql, creating MySql database, creating table, Accessing the database in php, Updating, Inserting, deleting, sorting data.

**Sessions, Cookies, and FTP:** Setting cookie and reading cookie, setting cookie expiration, deleting cookies, Working with FTP, Downloading and Uploading and deleting files with FTP, creating and removing directories with FTP, Sending E-mail, sending advanced email, adding attachments to the email, sorting data.

**Unit-4**

**Introduction to PYHON**: Getting Started with Python Programming, Detecting and correcting Syntax errors.

**Software Development, data types, and Expressions:** Software Development Process, case study: Income tax calculator, Strings, Assignments, and comments, Numeric data types and character sets, Expressions, Using functions and modules, Control statements.

**Design with Functions**: Functions as abstraction Mechanism, Problem solving with top-down design, recursive function, File system, Managing a program’s namespace, Higher Order Functions.

**Unit-5**

**String and Text Files**: Accessing characters and substrings in strings, data encryption, strings and number Systems, String Methods, Text Files, Case Study : Text Analysis.

**List and Dictionaries**: List, Defining simple Functions, case study: generating sentences, dictionaries, case study: nondirective psychology.

**Design with classes:** Getting inside objects and classes, case study: Playing the game of craps, data modelling examples, Structuring classes with Inheritance and Polymorphism.

**Text Books:**

1. The Complete Reference PHP by Steven Holzner, M H HILL Education, Indian Edition, 2008.

2. Fundamentals of PYTHON By Kenneth A. and Lambert and B.L Juneja, Cengage Learning, 2012.

**Reference Books:**

1. Core Python application and programming by Wesley J.Chun, Pearson, 3rd edition.

2. Introduction to computing and programming in python by Mark. J. Guzdial and

 Barbara Ericson, Pearson, 4th edition.

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| **15A05703** | **MOBILE APPLICATION DEVELOPMENT** |
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**Course Objectives:**

* To understand fundamentals of android operating systems.
* Illustrate the various components, layouts and views in creating android applications
* To understand fundamentals of android programming.

**Course Outcomes:**

* Create data sharing with different applications and sending and intercepting SMS.
* Develop applications using services and publishing android applications.
* To demonstrate their skills of using Android software development tools

**Unit 1: Introduction to Android:**

The Android 4.1 jelly Bean SDK, Understanding the Android Software Stack, installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text view Control, Using the Android Emulator, The Android Debug Bridge(ADB), Launching Android Applications on a Handset.

**Unit 2: Basic Widgets:**

Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

**Unit 3: Building Blocks for Android Application Design:**

Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation.

**Utilizing Resources and Media** Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets.

**Unit 4: Using Selection widgets and Debugging:**

Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective.

**Displaying And Fetching Information Using Dialogs and Fragments:** What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

**Unit 5: Building Menus and Storing Data:**

Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar

**Using Databases**:

Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form,

**Communicating with SMS and Emails:**

Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

**Text Books**

1. Android Programming by B.M Harwani, Pearson Education, 2013.

**References Text Books:**

1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013

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| **15A05706** |  **MACHINE LEARNING** **(CBCC-II)** |

**Course Objectives:**

* To understand the basic theory underlying machine learning.
* To be able to formulate machine learning problems corresponding to different applications.
* To understand a range of machine learning algorithms along with their strengths and weaknesses.
* To be able to apply machine learning algorithms to solve problems of moderate complexity.

**Course Outcomes:**

* Ability to understand what is learning and why it is essential to the design of intelligent machines.
* Ability to design and implement various machine learning algorithms in a wide range of real-world applications.
* Acquire knowledge deep learning and be able to implement deep learning models for language, vision, speech, decision making, and more

**Unit I:**

What is Machine Learning?, Examples of machine learning applications, supervised Learning: learning a class from examples, Vapnik- Chervonenkis dimension, probably approximately correct learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of a supervised machine learning algorithm. Decision Tree Learning: Introduction, Decisions Tree representation, Appropriate problems for decision tree learning, the basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, issues in decision tree learning, Artificial Neural Networks: Introduction, Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithm, Remarks on the BACKPROPGRATION Algorithm, An illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.

**Unit 2:**

Evaluating Hypotheses: Motivation, Estimating hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, differences in error of two hypothesis, comparing learning algorithms, Bayesian Learning: Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and least squared error hypothesis, Maximum Likelihood hypothesis for predicting probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm , Naïve Bayes Classifier , Bayesian Belief Network, EM Algorithm

**Unit 3:**

Dimensionality Reduction: Introduction, Subset selection, principle component analysis, feature embedding, factor analysis, singular value decomposition and matrix factorization, multidimensional scaling, linear discriminant analysis, canonical correlation analysis, Isomap, Locally linear embedding, laplacian eigenmaps, Clustering: Introduction, Mixture densities, K- Means clustering, Expectations- Maximization algorithm, Mixture of latent variable models, supervised learning after clustering, spectral clustering, Hierarchal clustering, Choosing the number of clusters, Nonparametric Methods: Introduction, Non Parametric density estimation, generalization to multivariate data, nonparametric classification, condensed nearest neighbor, Distance based classification, outlier detection, Nonparametric regression: smoothing models, how to choose the smoothing parameter

**Unit 4:**

Linear Discrimination: Introduction, Generalizing the linear model, geometry of the linear discrimination, pair wise separation, parametric discrimination revisited, gradient descent, logistic discrimination, discrimination by regression, learning to rank, Multilayer Perceptrons: Introduction, the perceptron, training a perceptron, learning Boolean functions, multilayer perceptrons, MLP as a universal approximator, Back propagation algorithm, Training procedures, Tuning the network size, Bayesian view of learning, dimensionality reduction, learning time, deep learning

**Unit 5:**

Kernel Machines: Introduction, Optimal separating hyperplane, the non separable case: Soft Margin Hyperplane, ν-SVM, kernel Trick, Vectorial kernels, defining kernels, multiple kernel learning, multicast kernel machines, kernel machines for regression, kernel machines for ranking, one-class kernel machines, large margin nearest neighbor classifier, kernel dimensionality reduction, Graphical models: Introduction, Canonical cases for conditional independence, generative models, d separation, belief propagation, undirected Graphs: Markov Random files, Learning the structure of a graphical model, influence diagrams.

**Text Books:**

1) Machine Learning by Tom M. Mitchell, Mc Graw Hill Education, Indian Edition, 2016.

2) Introduction to Machine learning, Ethem Alpaydin, PHI, 3rd Edition, 2014

**References Books:**

1) Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis,

 CRC Press Book

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|  **15A05707** | **SOFTWARE PROJECT MANAGEMENT** **(CBCC-II)** |

***Course 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:

* Understanding the specific roles within a software organization as related to project and process management
* Describe the 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).
* Understanding the basic infrastructure competences (e.g., process modeling and measurement)
* Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships

**Course Outcomes:**

* Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
* Compare and differentiate organization structures and project structures
* Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

**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 discriminates, Example.

**Future Software Project Management:** Modern Project Profiles Next generation Software economics, modern Process transitions.

**Case Study:** The Command Center 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

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| **15A05805** | **ENABLING TECHNOLOGIES FOR DATA SCIENCE & ANALYTICS: IoT****(CBCC-II)** |

**Course objectives:**

* Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IoT Devices.

**Course Outcomes:**

* Able to understand the application areas of IoT
* Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
* Able to understand building blocks of Internet of Things and characteristics.

**UNIT I: Introduction to Internet of Things**Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies**.**

**Domain Specific IoTs**Introduction, Home Automation, cities, Environment, Retail, Agriculture, Industry, Health & Lifestyle.

**UNIT II:
 IoT and M2M**Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT.
**IoT System Management with NETCONF-YANG** Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator requirements, NETCONF, YANG, IoT System Management with NETCONF-YANG.

**UNIT III: Developing Internet of Things**Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring.

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

**UNIT IV**

**Advanced Topics:**Introduction, Apache Hadoop, Using Hadoop Map Reduce for Batch Data Analysis.

**IEEE 802.15.4:**

The IEEE 802 committee family of protocols, The physical layer, The Media Access control layer, Uses of 802.15.4, The Futureof 802.15.4: 802.15.4e and 802.15.4g.

**UNIT V:**

**ZigBee:**

Development of the standard, ZigBee Architecture, Association, The ZigBee network layer, The ZigBee APS Layer, The ZigBee Devices Object (ZDO) and the ZigBee Device Profile (ZDP), Zigbee Security, The ZigBee Cluster Library (ZCL), ZigBee Applications profiles, The ZigBee Gateway Specifications for network devices.

**TEXT BOOKS:**1. Internet of Things a Hands-on Approach by Arshdeep Bahga and Vijay Madisetti. University Press.

2. The Internet of Things key applications and protocols by Oliver Hersent, David Boswarthick and Omar elloumi, Wiley Student Edition.

**REFFERENCE BOOOKS:**1. Internet of Things: Architecture, Design Principles and Applications by Raj Kamal MCGraw Hill Edition.

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| **15A12703** | **HUMAN COMPUTER INTERACTION** **(CBCC – III)** |

**Course Objectives:**

* 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
* Be familiar with a variety of both conventional and non-traditional user interface paradigms

**Course Outcomes:**

* Find innovative ways of interacting with computers
* Help the disabled by designing non-traditional ways of interacting
* Use cognitive psychology in the design of devices for interaction

## *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** – Understanding how people interact with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business functions.

**Screen Designing**: Design goals – Screen meaning 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**

System menus: Structures of Menus, Functions of Menus, Content of Menus, Kinds of Graphical menus

Windows: Window characteristics, Components of a window, Window presentation styles, Types of windows, Windom management

**UNIT- IV**

Controls: Characteristics of device based controls, Selecting the proper device based controls, Operable controls, Text Entry/Read-only controls, Selection controls, Combination Entry/selection controls, Selecting the proper controls.

**UNIT- V**

Graphics: Icons, Multimedia, Color-what is it, Color uses, Color and Human vision, Choosing colors

Testing: The purpose and importance of usability testing, Scope of testing, Prototypes, Kinds of Tests, Developing and conducting the test.

**Text books:**

1. “The essential guide to user interface design”, Wilbert O Galitz,, Wiley, 2nd edition, 2013.

**References:**

1. “Designing the user interface”, 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. “Human –Computer Interaction”, D.R.Olsen, Cengage Learning.
3. “Human – Computer Interaction”, I.Scott Mackenzie, Elsevier Publishers.
4. “Interaction Design”, Prece, Rogers, Sharps, Wiley Dreamtech.
5. “User Interface Design”, Soren Lauesen , Pearson Education.
6. “Human –Computer Interaction”, Smith - Atakan, Cengage Learning.

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| **15A12704** | **INFORMATION RETRIEVAL SYSTEMS** **(CBCC-III)** |

**Course 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

**Course Outcomes:**

At the end of the course students will be assessed to determine whether they are able to

* store and retrieve textual documents using appropriate models
* use the various retrieval utilities for improving search
* do indexing and compressing documents to improve space and time efficiency
* formulate SQL like queries for unstructured data

**UNIT I**

**Introduction to Information Retrieval**

**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 distribted retrieval, Web search.

**Text Books :**

1. Information Retrieval – Algorithms and Heuristics, David A. Grossman, Ophir Frieder, 2nd Edition, 2012, Springer, (Distributed by Universities Press)

**Reference Books :**

1. Modern Information Retrieval Systems, Yates, Pearson Education

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

3. Mining the Web : Discovering Knowledge from Hypertext Data, Soumen

Chakrabart i Morgan-Kaufmann Publishers, 2002

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

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|  **15A05709** |  **REAL TIME SYSTEMS** **(CBCC-III)** |

**Course Objectives:**

* Acquire skills necessary to design and develop embedded applications by means of real-time operating systems
* Understand embedded real-time operating systems

**Course Outcomes:**

* Characterize real-time systems and describe their functions
* Analyze, design and implement a real-time system
* Apply formal methods to the analysis and design of real-time systems
* Apply formal methods for scheduling real-time systems
* Characterize and describe reliability and fault tolerance issues and approaches.

**Unit-1**

**Typical Real time Applications:** Digital control, High-level control, Signal processing, other Real-time Applications.

**Hard versus Soft Real-Time Systems:** Jobs and processors, Release time, dead lines and Timing constraints, Hard and soft timing constraints, Hard Real time systems, Soft Real-time Systems.

**A Reference Model of Real Time Systems:** Processors and resources, Temporal parameters of Real time workload, periodic task model, precedence constraints and data dependency, Functional parameter, Resource Parameters of Jobs and Parameters of Resources, Scheduling Hierarchy.

**Commonly used Approaches to real time Scheduling:** Clock-Driven Approach, Weighted Round-Robin Approach, Priority driven Approach, Dynamic vs Static Systems, Effective release time and deadlines, Optimality of the EDF and LST algorithms, Nonoptimality of the EDF and LST algorithms, Challenges in validating timing constraints in priority driven System, Off line vs On line scheduling, summary.

 **Unit-2**

Clock-Driven Scheduling: Notations and Assumptions, static, Timer-Driven scheduler, General Structure of the Cyclic Scheduler, Improving the average response time of Aperiodic Jobs, Scheduling sporadic Jobs, Practical considerations and generalizations, Algorithm for generating Static Schedules, Pros and cons of Clock-driven scheduling, summary.

**Unit-3**

**Priority-Driven Scheduling of periodic Tasks :** Static Assumption, Fixed-priority vs Dynamic-priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms, A Schedulability test for Fixed-priority tasks with Short Response time, A Schedulability test for Fixed-priority tasks with arbitrary Response time, Sufficient Schedulability conditions for the RM and DM Algorithms, summary.

**Unit-4**

**Scheduling Aperiodic and Sporadic Jobs in Priority Driven Systems:** Assumptions and approaches, Diferrable servers, Sporadic Servers, Constant utilization, total bandwidth and weighted fair –Queueing servers, Slack stealing in Dead-line Driven System, Stack stealing in Fixed-priority systems, Scheduling of sporadic jobs, Real-time performance for jobs with soft timing constraints, A two-level scheme for Integrated scheduling.

**Unit-5**

**Resources and Resource access control:** Assumptions on Resources and their usage, Effects of Resource contention and resource access control, Non Preemptive critical section, Basic Priority inheritance protocol, Basic Priority ceiling protocol, Stack –based, Priority ceiling protocol, Use of priority ceiling protocol in Dynamic priority systems, pre-emption ceiling protocol, Controlling accesses to Multiple unit Resources, Controlling concurrent accesses to data objects.

**Multiprocessor Scheduling, Resource access control, and Synchronization:** Model of Multiprocessor and Distributed Systems, Task assignment, Multiprocessor Priority ceiling protocol, Elements of Scheduling Algorithms for End-to-End Periodic Tasks, Schedulability of Fixed-priority End-to-End periodic Tasks, End to End tasks in heterogeneous Systems, Predictability and validation of Dynamic Multiprocessor Systems, Summary.

**Text Book:**

 1. “Real-Time Systems” by Jane W.S Liu, Pearson Edition, 2006.

**Reference Text Book:**

1. Real-Time Systems: Scheduling, Analysis, and Verification, Cheng, A. M. K.: Wiley, 2002.
2. Z.: Scheduling in Real-Time Systems, by Cottet, F., Delacroix, J., Kaiser, C., Mammeri John Wiley & Sons, 2002.

Real-Time Systems, C. M., Shin, K. G. McGraw-Hill, Krishna 1997.

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| **15A12705** | **SCRIPTING LANGUAGES LABORATORY** |

**Course Objectives:**

The primary objective of the course is to learn web programming by designing and developing a web based project and also learn basic User Interface Principles.

**Course Outcomes:**

**At the end of the course, the student should be able to:**

* Ability to build interactive, data-driven sites and solve real time problems using PHP
* Ability to create dynamic web pages using the PHP scripting language and MySQL database.
* Understand the concepts of object-oriented programming as used in Python: classes, subclasses, inheritance, and overriding. Understand the basics of OO design.

**Scripting Languages**

1. Installation of IIS/WAMP/XAMPP/LAMP web server and configure apache modules and php extensions.
2. Write a program to illustrate the use of
	1. Conditional statements
	2. Looping statements
	3. Array functions

In php.

1. Write a program to generate Fibonacci series for a given number using **Object-oriented PHP**.
2. Design a HTML form for Registration process (which includes various input types) and validate all the fields using JavaScript.
3. Submitting the registration form using following technologies :
	1. HTML form submit
	2. AJAX
	3. JQuery
4. Write a program to illustrate cross-site scripting attack and sanitizing & filtering user input.
5. Connect to MySQL database using the following concepts in php
	* + 1. MySQLi functions
			2. Prepared statements
			3. PDO
6. Create a login application with the help of following techniques.
	1. Sessions
	2. Cookies
7. Write a program to implement full-text search interface using PHP and MySQL.
8. Write a python program for Income Tax Calculator.
9. Write a python program to illustrate Text Analysis.
10. Write a python program to simulate craps game.

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|  **15A05711** | **MOBILE APPLICATION DEVELOPMENT LABORATORY** |

**Course Objectives:**

* To understand fundamentals of android operating systems.
* Illustrate the various components, layouts and views in creating android applications
* To understand fundamentals of android programming.

**Course Out comes:**

* Create data sharing with different applications and sending and intercepting SMS.
* Develop applications using services and publishing android applications.
* To demonstrate their skills of using Android software development tools

1. Setting Up the Development Environment

 1.1 Download/Install the SDK

For in-depth instructions, visit [Android Installation Documentation](http://developer.android.com/sdk/installing.html). Otherwise perform the following steps.

* Go to <http://developer.android.com/sdk/index.html>.
* Unpack to a convenient location - Remember the full path to this location, we will refer to it as *<*android\_sdk\_dir*>* for the rest of the lab.
	+ *<android\_sdk\_dir> would then be /home/<username>/android\_dir.*
* Add the path to the <android\_sdk\_dir>/tools directory to your system PATH
	+ Windows:
		1. Right-click My Computer.
		2. Click Properties.
		3. Click Advanced tab.
		4. Click Environment Variables button.
		5. Double Click Path under System Variables.
		6. Add ; <android\_sdk\_dir>/tools;<android\_sdk\_dir>/platform-tools to the end of the Variable Values text field.
* Navigate to your <android\_sdk\_dir>/tools directory and type android.
Add the appropriate components.  See step 4 in <http://developer.android.com/sdk/installing.html>.
* Test your installation by running adb from the command line.  If you did everything right, you should get a long list of help instructions.

1.2 Download/Install the Eclipse Plugin

* It is recommended that you use Eclipse 3.4 or later
	+ Lab Machines - Fedora Eclipse based on 3.4.2
	The version of Eclipse used by the lab machines is missing a vital component and requires adding an additional Eclipse plugin in order to use the Android plugin:
		1. Click the menu Help -> Software Updates.
		2. Click the tab Available Software -> Add Site button.
		3. Enter http:// download.eclipse.org/releases/ganymede into the Location field.
		4. Click OK button.
		5. Enter WST Common UI into the search/text box at the top of the window (give it a second, it tries to search as you type and its kind of slow).
		6. Click the checkbox next to WST Common UI.
		7. Click the Install button.
		8. Click the Next button.
		9. Accept the terms, click Finish.
		10. Restart Eclipse.
		11. Follow the steps in the next bullet 3.4 Ganymede.
	+ Eclipse 3.4 Ganymede:
		1. Click the menu Help -> Software Updates.
		2. Click Available Software tab -> Add Site button.
		3. Enter https://dl-ssl.google.com/andriod/eclipse into the "Location" field.
		4. Click OK button.
		5. Click the checkbox next to Developer Tools.
		6. Click the Install button.
		7. Click the Next button.
		8. Accept the terms, click Finish.
		9. Restart Eclipse.
	+ Eclipse 3.5 Galileo:
		1. Click Help -> Install New Software .
		2. Click Add... button.
		3. Enter a name for the site into the Name field.
		4. Enter htpps://dl-ssl/google.com/android/eclipse/ into the Location field.
		5. Click OK button.
		6. Click the checkbox next to Developer Tools.
		7. Click the Next button.
		8. Accept the terms, click Finish.
		9. Restart Eclipse.
* Point Eclipse to <android\_sdk\_dir>:
	1. Click the menu Window -> Preferences.
	2. Click Android from the Hierarchy view on the left hand side.
	3. Enter <android\_sdk\_dir> into the SDK Location field.
	4. Click the Apply button.
	5. Click the OK button.

1.3 Download/Install the SDK Platform Components

At the time of writing this lab there are are eight different versions of the Android Platform available, ranging from 1.1 to 2.2. It is best practice to develop for the oldest platform available that still provides the functionality you need. This way you can be assured that your application will be supported by as many devices as possible. However, you will still want to download newer versions of the platforms so that you can test your applications against these as well. Due to the size of each platform component you will only be required to download and develop on one platform for the whole class. We will target the highest platform that the G1 phones support, Android 1.6 (API 4).  Before we can begin developing we must download and install this platform:

* Select the menu Window -> "Android SDK and AVD Manager", or click on the black phone shaped icon in the toolbar.
* Select Available Packages on the left hand side.
* Expand the Google Android site in the "Site, Packages, and Archives" Tree.
* Check the following items:
	+ SDK Plaform Android 1.6, API 4 Revision 3
	+ Google APIs by Google Inc., Android API 4, Revision 2
	+ *NOTE: Those of you developing on Lab Machines should follow these instructions:*[http://sites.google.com/site/androidhowto/how-to-1/set-up-the-sdk-on-lab-machines-linux](https://sites.google.com/site/androidhowto/how-to-1/set-up-the-sdk-on-lab-machines-linux).
* Click Install Selected.
* Accept the Terms for all packages and click Install Accepted.

We're now ready to develop our application.

2. Create "Hello World" Application

2.1 Create a new Android Project

2.2 Run "Hello World" on the Emulator

2.3  On a Physical Device

2.4 Greeting the User

3. Create Application by Using Widgets

3.1 Creating the Application by using the Activity class

* + 1. onCreate()
		2. onStart()
		3. onResume()
		4. onPause()
		5. onStop()
		6. onDestroy()
		7. onRestart()

3.2 Creating the Application by using Text Edit control.

3.3 Creating the Application Choosing Options

(i) CheckBox

(ii) RadioButton

(iii) RadioGroup

(iv) Spinner

4. Create Application by Using Building Blocks for Android Application Design

 4.1 Design the Application by using

(i) Linear Layout

(ii) Relative Layout

(iii) Absolute Layout

 4.2 Create the Application to play the Audio and Video clips.

5. Create Application by Using Building Menus and Storing Data

 5.1 Design the Application for Menus and Action Bar

 5.2 Design the application to display the Drop-Down List Action Bar

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|  **15A05801** |  **DATA ANALYTICS**  **(MOOCS-II)** |

**Course Objectives:**

* To introduce the terminology, technology and its applications
* To introduce the concept of Analytics for Business
* To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

**Course Outcomes:**

* Ability to work with different data types.
* Ability to solve various problems related to businesses.
* Ability to effectively utilize the time and involve in collaborative tasks.

**Unit I**

**Introduction to Analytics and R programming (NOS 2101)**

Introduction to R, RStudio (GUI): R Windows Environment, introduction to various data types, Numeric, Character, date, data frame, array, matrix etc., Reading Datasets, Working with different file types .txt,.csv etc. Outliers, Combining Datasets, R Functions and loops. Summary Statistics - Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem etc.

**Unit II**

**SQL using R & Correlation and Regression Analysis (NOS 2101)**

Introduction to NoSQL, Connecting R to NoSQL databases. Excel and R integration with R connector. Regression Analysis, Assumptions of OLS Regression, Regression Modelling. Correlation, ANOVA, Forecasting, Heteroscedasticity, Autocorrelation, Introduction to Multiple Regression etc.

**Unit III**

**Understand the Verticals - Engineering, Financial and others (NOS 2101)**

Understanding systems viz. Engineering Design, Manufacturing, Smart Utilities, Production lines, Automotive, Technology etc. Understanding Business problems related to various businesses

**Unit IV**

**Manage your work to meet requirements (NOS 9001)**

Understanding Learning objectives, Introduction to work & meeting requirements, Time

Management, Work management & prioritization, Quality & Standards Adherence,

**Unit V**

**Work effectively with Colleagues (NOS 9002)**

Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc. NOS \* National Occupational Standards

**Text Books:**

**1.** Student’s Handbook for Associate Analytics.

**2.** Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert

Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014

**3.** A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge

University Press, 2007

**4.** Data Manipulation with R, Jaynal Abedin and Kishor Kumar Das, Second Edition, Packt

publishing, BIRMINGHAM – MUMBAI.

**5.** Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons,

Inc, 2012

**Reference Books:**

**1.** Introduction to Probability and Statistics Using R, ISBN: 978-0-557-24979-4, is a textbook

written for an undergraduate course in probability and statistics.

**2.** An Introduction to R, by Venables and Smith and the R Development Core Team. This may

be downloaded for free from the R Project website (http://www.r-project.org/, see Manuals).

There are plenty of other free references available from the R Project website.

**3.** Time Series Analysis and Mining with R**,** Yanchang Zhao

**4.** Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010

**5.** Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun,

Cambridge University Press, 2010

**6.** Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015

**7.** Introduction to Probability and Statistics Using R, G. jay Kerns, First Edition, 2011

**8.** The Art of Data Science- A Guide for anyone Who Works with Data – Roger D. Peng and

Elizabeth Matsui, Leanpub Publications, 2014

**9.** Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for

engineers. John Wiley & Sons, 2010.The Basic Concepts of Time Series Analysis.

http://anson.ucdavis.edu/~azari/sta137/AuNotes.pdf

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|  **15A05802** |  **MOBILE COMPUTING** **(MOOCS-II)** |

**Course Objectives:**

* Understand mobile ad hoc networks, design and implementation issues, and available solutions.
* Acquire knowledge of sensor networks and their characteristics.

**Course Outcomes:**

* + Students able to use mobile computing more effectively
	+ Students gain understanding of the current topics in MANETs and WSNs, both from an industry and research point of views.
	+ Acquire skills to design and implement a basic mobile ad hoc or wireless sensor network via simulations.

**UNIT-I:**

**Wireless LANS and PANS:** Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.

**Wireless Internet:**

Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP, Optimizing Web over Wireless.

**UNIT-II:**

**AD HOC Wireless Networks**: Introduction, Issues in Ad Hoc Wireless Networks, AD Hoc Wireless Internet.

**MAC Protocols for Ad Hoc Wireless Networks:** Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

**UNIT -III:**

**Routing Protocols:** Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand

Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

**Transport Layer and Security Protocols:** Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

**UNIT –IV:**

**Quality of Service:** Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks.

**Energy Management:** Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Ad Hoc Wireless Networks, Battery Management Schemes, Transmission Power Management Schemes, System Power Management Schemes.

**UNIT –V:**

**Wireless Sensor Networks:** Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

**TEXT BOOKS:**

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and

B.S.Manoj, PHI, 2004.

2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan

Sarangapani, CRC Press

**REFERENCE BOOKS:**

1. Ad hoc Mobile Wireless Networks – Subir Kumar sarkar, T G Basvaraju, C Puttamadappa, Auerbach Publications,2012.

2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.

3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , Pearson Education.

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|  **15A05803** |  **INNOVATIONS AND IT MANAGEMENT**  **(MOOCS-II)** |

**Course Objectives:**

* Understand the rule of information technology in businesses, in state or central government departments and in remote parts of India.
* Understand the future of information systems and the manner in which they are shaping the world around us.
* Understand the Ethical and Social issues concerning information systems.

**Course Outcomes:**

* Ability to do Business over the Internet.
* Ability to solve Business problems by applying analytics.
* Ability to use ICT to participate in Democratic process.

**Unit-1:**

**Organisations and Information Systems:** Modern organization, Information systems in organisations, The role of Internet, , Managing in the Internet Era, Managing Information Systems in Organisations, Challenges for the Manager. **Concepts of MIS:**  Data and information, Information as a Resource, Information in Organisational Functions, Types of Information Technology, Types of Information Systems, Decision Making with MIS, Communication in Organisations. **Information systems and Management Strategy:** The Competitive environment of Business, Using IT for Competing, Information goods, Information systems and competitive Strategy.

**Unit- 2:**E-Commerce technology, HTML and E-mail, Business over the Internet, E-Business, E-Governance. **Managing Information Systems:** Challenges of managing the IT Function, Vendor Management, The role of CIO, Ethical Issues, and Social Issues.

**Unit- 3: Infrastructure of IT:** What is IT Infrastructure, IT infrastructure Decisions, Infrastructure components, networks, solutions, cloud computing, Virtualization, Enterprise systems, IT Outsourcing, Networks in organisation and what has to be managed. **Information systems security and control:** Threats to the organization, Technologies for handling security, managing security.

**Unit- 4:** Analysis of Business Process, Business Process Integration, Motivation for Enterprise systems (ES), Supply chain management systems, Customer Relationship Management systems, Challenges for ES implementations, International Information systems, Decision support systems (DSS), Components of DSS, Analytical and Business Intelligence, Knowledge Management.

**Unit-5:** ICT Development, Types of ICT interventions, Examples, E-Governance concepts, E-Government, E-Participation, Social Dynamics of the internet, Services of the Internet, Technology of the Internet, Social Issues, Social networks in the Enterprise, concept of open source software, open source licences, open source in business and Government, open Data Standards and the open community.

**Text book:**

1. “MIS: Managing information Systems and in Business, Government and Society” Rahul De, Wiley publications.

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|  **15A05804** | **BUILDING LARGE SCALE SOFTWARE SYSTEMS** **(MOOCS-III)** |

**Course Objectives:**

* To introduce the architecture of large c programs.
* To introduce the concept Case study for design of large C programs using Linux kernel.
* To introduce the tools, technologies & programming languages.

**Course Outcomes:**

* Student able to understand coupling and cohesion
* Student able to design large c and c++ programs using Linux kernel
* Student able to understand how to design Linux kernel
* Ability to solve various problems related to Object Oriented Software using patterns

**Unit I:** Architecture of Large C Programs : Coupling and Cohesion concepts , types of cohesion functional, sequential, procedural, temporal, logical and coincidental; types of coupling – data,stamp, control, common, content coupling.

**Unit II:** Designing Large C programs having good cohesion and coupling; C modules- notion of separate compilation; Case study for design of large C programs using linux kernel.

**Unit III:** Tools for building large programs – version control using git and building large programs using make – bug tracking systems – bugzilla.

**Unit IV:** Building Large C++ programs – Architecture of Large C ++ programs – Coupling and Cohesion of C++ programs, Metrics for measuring the quality of C++ programs, Chidamber and Krammer. Metric suite- MOOD metrics – improving the design of C++ programs; Case study of redesigning Linux kernel into Minimalistic Object Oriented Linux (MOOL).

**Unit V:** Pattern Oriented Software Architecture: Building object oriented programs using design patterns identification of design patterns in source code- refactoring existing programs into design pattern based programs- case studies of building software with design patterns.

**Text Books:**

1. D. Janakiram, “Building Large Scale Software Systems”, McGraw Hill Education, 2013.
2. John Lakos , “Large-Scale C++ Software Design”, Addison Wesley, 1996.

**References:**

1. Scott W. Ambler, Barbara Hanscome, “Process Patterns: Building Large-Scale Systems Using Object Technology”, 1st Edition, Camebridge University Press, 1998.
2. Peter van der Linden, “Expert C Programming: Deep C Secrets 1st Edition”, Prentice Hall.

3 . Andrei Alexandrescu, “Modern C++ Design: Generic Programming and

 Design Patterns Applied”, 1st Edition, Addison Wesley, 2011.

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| **15A05507** |  **R-PROGRAMMING** **(MOOCS-III)** |

**Course Objectives:**

* Understand the fundamentals of 'R' programming
* Learn how to carry out a range of commonly used statistical methods including analysis of variance and linear regression.
* Explore data-sets to create testable hypotheses and identify appropriate statistical tests.

**Course Outcomes:**

* Ability to Work on a real life Project, implementing R Analytics to create Business Insights.
* Ability to analyze the data and results using R, a flexible and completely cross- platform.
* Ability to use a wide range of analytical methods and produce presentation quality graphics.

**UNIT-I**

**INTRODUCING R**: Getting the Hand of R, Running the R Program, Finding Your Way with R, Command Packages.

**BECOMING FAMILIAR WITH R**: Reading and Getting Data into R, Viewing Named Objects, Types of Data Items, The Structure of Data Items, Examining Data Structure Working with History Commands, Saving your Work in R.

**WORKING WITH OBJECTS:** Manipulating Objects, Viewing Objects within Objects, Constructing Data Objects, Forms of Data Objects: Testing and Converting,

**UNIT II**

**Data**: Descriptive statistics and tabulation.

**DISTRIBUTION:** Looking at the Distribution of Data

**SIMPLE HYPOTHESIS TESTING**: Using the Student’s t-test, The Wilcoxon U-Test (Mann-Whitney), Paired t- and U-Tests, Correlation and Covariance, Tests for Association.

**UNIT-III**

**INTRODUCTION TO GRAPHICAL ANALYSIS**: Box-whisker Plots, Scatter Plots, Pairs Plots(Multiple Correlation Plots) Line Charts, Pie Charts, Cleveland Dot Charts, Bar Charts, Copy Graphics to Other Applications.

**FORMULA NOTATION AND COMPLEX STATISTICS**: Examples of Using Formula Syntax for Basic tests, Formula Notation in Graphics, Analysis of Variance (ANOVA).

**UNIT-IV**

**MANIPULATING DATA AND EXTRACTING COMPONENTS**: Creating Data for Complex Analysis, Summarizing Data.

**REGRESSION (LINEAR MODELING**): Simple Linear Regression, Multiple Regression, Curvilinear Regression, Plotting Linear Models and Curve Fitting, Summarizing Regression Models.

**UNIT-V**

Adding elements to existing plots, Matrix plots, multiple plots in one window, exporting graphs

**WRITING YOUR OWN SCRIPTS**:

BEGINNING TO PROGRAM: Copy and Paste Scripts, Creating Simple Functions, Making Source Code.

**Text Books:**

1. “Beginning R the statistical programming language” Dr. Mark Gardener, Wiley Publications, 2015.

**References Books:**

1. [Hands-On Programming with R Paperback by](http://www.amazon.in/Programming-Beginners-Step---Step-Learning-ebook/dp/B01F1KOOOQ/ref%3Dsr_1_3?s=books&ie=UTF8&qid=1467804853&sr=1-3&keywords=r+programming+books" \o "R: Easy R Programming for Beginners, Your Step-By-Step Guide To Learning R Programming (R Programming Series))[[Grolemund](http://www.amazon.in/Programming-Beginners-Step---Step-Learning-ebook/dp/B01F1KOOOQ/ref%3Dsr_1_3?s=books&ie=UTF8&qid=1467804853&sr=1-3&keywords=r+programming+books" \o "R: Easy R Programming for Beginners, Your Step-By-Step Guide To Learning R Programming (R Programming Series))](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Grolemund&search-alias=stripbooks)[(Author),](http://www.amazon.in/Programming-Beginners-Step---Step-Learning-ebook/dp/B01F1KOOOQ/ref%3Dsr_1_3?s=books&ie=UTF8&qid=1467804853&sr=1-3&keywords=r+programming+books" \o "R: Easy R Programming for Beginners, Your Step-By-Step Guide To Learning R Programming (R Programming Series))[[Garrett](http://www.amazon.in/Programming-Beginners-Step---Step-Learning-ebook/dp/B01F1KOOOQ/ref%3Dsr_1_3?s=books&ie=UTF8&qid=1467804853&sr=1-3&keywords=r+programming+books" \o "R: Easy R Programming for Beginners, Your Step-By-Step Guide To Learning R Programming (R Programming Series))](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Garrett&search-alias=stripbooks)[(Author), SPD, 2014.](http://www.amazon.in/Programming-Beginners-Step---Step-Learning-ebook/dp/B01F1KOOOQ/ref%3Dsr_1_3?s=books&ie=UTF8&qid=1467804853&sr=1-3&keywords=r+programming+books" \o "R: Easy R Programming for Beginners, Your Step-By-Step Guide To Learning R Programming (R Programming Series))
2. The R Book, [Michael J. Crawley](http://www.amazon.in/Michael-J.-Crawley/e/B001IGQIPG/ref%3Ddp_byline_cont_book_1), WILEY, 2012.

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|  **15A05806** |  **CYBER SECURITY** **(MOOCS-III)** |

**Course Objectives:**

* Appraise the current structure of cyber security roles across the DoD enterprise, including the roles and responsibilities of the relevant organizations.
* Evaluate the trends and patterns that will determine the future state of cyber security

**Course Outcomes:**

* Analyze threats and risks within context of the cyber security architecture
* Appraise cyber security incidents to apply appropriate response
* Evaluate decision making outcomes of cyber security scenarios

**Unit-I**

Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era. Cases.

**Unit-II**

Tools and methods used in cyber crime-Proxy servers and Anonymizers- PhishingPassword cracking-Key loggers and Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network. Cases.

**Unit-III**

Understanding computer forensic-Historical background of cyber forensicForensic analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory-Relevance of the OSI 7 Layer model to computer Forensic-Computer forensic from compliance perspectives. Cases.

**Unit-IV**

Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cases.

**Unit-V**

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations. Cases.

**Text book:**

 1. Nina Godbole & Sunit Belapure “Cyber Security”, Wiley India, 2012.

**REFERENCES:**

1. Harish Chander, “cyber laws & IT protection”, PHI learning pvt.ltd, 2012.
2. Dhiren R Patel, “Information security theory & practice”,PHI learning pvt ltd,2010.
3. MS.M.K.Geetha & Ms.Swapne Raman”Cyber Crimes and Fraud Management, ”MACMILLAN,2012. Pankaj Agarwal : Information Security& Cyber Laws (Acme Learning), Excel, 2013.
4. Vivek Sood, Cyber Law Simplified, TMH, 2012.