**THE ASSAM DOWNTOWN UNIVERSITY**

**SCHOOL OF COMPUTING SCIENCES**

**BACHELOR OF SCIENCE IN MOBILE APPLICATION AND INFORMATION SECURITY**

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| **Year I Semester I** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| 1 | **Theory** | BMA101 | Communication Skills | 3 | 0 | 0 | 3 |
| 2 | BMA102 | Fundamentals of Mathematics | 3 | 0 | 0 | 3 |
| 3 | BMA103 | Computer Fundamentals and Organization | 3 | 0 | 0 | 3 |
| 4 | BMA104 | Programming in C | 4 | 0 | 0 | 4 |
| 5 | BMA105 | Introduction to Linux | 3 | 0 | 0 | 3 |
| 6 | **Practical** | BMA114 | C Programming Laboratory | 0 | 0 | 3 | 2 |
| 7 | BMA115 | Linux Laboratory | 0 | 0 | 3 | 2 |
|  | | | | | | | |
| **Total Contact Hours and Credits** | | | | **16** | **0** | **6** | **20** |
| **Cumulative Contact Hours and Credits** | | | | **16** | **0** | **6** | **20** |

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| **Year I Semester II** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| 1 | **Theory** | BMA201 | Reasoning and Thinking | 3 | 0 | 0 | 3 |
| 2 | BMA202 | Operating System | 4 | 0 | 0 | 4 |
| 3 | BMA203 | OOPS with C++ | 4 | 0 | 0 | 4 |
| 4 | BMA204 | Data Structure using C | 4 | 0 | 0 | 4 |
| 5 | BMA205 | Introduction to Java Scripting | 3 | 0 | 0 | 3 |
| 6 | **Practical** | BMA213 | OOPS with C++ Laboratory | 0 | 0 | 3 | 2 |
| 7 | BMA214 | Data Structures using C Laboratory | 0 | 0 | 3 | 2 |
|  | | | | | | | |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **6** | **22** |
| **Cumulative Contact Hours and Credits** | | | | **34** | **0** | **12** | **42** |
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| **Year II Semester III** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| 1 | **Theory** | BMA301 | Information Security Fundamentals | 3 | 0 | 0 | 3 |
| 2 | BMA302 | Software Engineering | 4 | 0 | 0 | 4 |
| 3 | BMA303 | Relational Database Management Systems | 4 | 0 | 0 | 4 |
| 4 | BMA304 | Computer Networks Fundamentals | 3 | 0 | 0 | 3 |
| 5 | BMA305 | Programming in JAVA | 4 | 0 | 0 | 4 |
| 6 | **Practical** | BMA313 | Relational Database Management Laboratory | 0 | 0 | 3 | 2 |
| 7 | BMA315 | Java Programming Laboratory | 0 | 0 | 3 | 2 |
|  | | | | | | | |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **6** | **22** |
| **Cumulative Contact Hours and Credits** | | | | **52** | **0** | **18** | **64** |
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| **Year II Semester IV** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| 1 | **Theory** | BMA401 | Enterprise Application Development | 2 | 0 | 2 | 3 |
| 2 | BMA402 | Ethical Hacking Fundamentals | 3 | 0 | 0 | 3 |
| 3 | BMA403 | Cryptography Fundamentals | 3 | 0 | 0 | 3 |
| 4 | BMA404 | Basic Android | 3 | 0 | 0 | 3 |
| 5 | BMA405 | Mobile Architecture and App Development | 3 | 0 | 0 | 3 |
| 6 | BMA406 | Introduction to cloud computing | 3 | 0 | 0 | 3 |
| 7 | **Practical** | BMA412 | Ethical Hacking Laboratory | 0 | 0 | 3 | 2 |
| 8 | BMA414 | Basic Android - Laboratory | 0 | 0 | 3 | 2 |
|  | | | | | | | |
| **Total Contact Hours and Credits** | | | | **17** | **0** | **8** | **22** |
| **Cumulative Contact Hours and Credits** | | | | **69** | **0** | **26** | **86** |
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| **Year III Semester V** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| 1 | **Theory** | BMA501 | Computer Forensics – an Introduction | 3 | 0 | 0 | 3 |
| 2 | BMA502 | Virtualization and Cloud Security | 4 | 0 | 0 | 4 |
| 3 | BMA503 | IT Governance, Risk & Information Security Management | 4 | 0 | 0 | 4 |
| 4 | BMA504 | Mobile Ecosystem, Business Analysis and Models | 4 | 0 | 0 | 4 |
| 5 | BMA505 | Advanced Android | 4 | 0 | 0 | 4 |
| 6 | BMA506 | Web Technology and Value added services in mobile | 2 | 0 | 2 | 3 |
| 7 | **Practical** | BMA511 | Computer Forensics Laboratory | 0 | 0 | 3 | 2 |
| 8 | BMA515 | Advanced android - Laboratory | 0 | 0 | 3 | 2 |
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| **Total Contact Hours and Credits** | | | | **21** | **0** | **8** | **26** |
| **Cumulative Contact Hours and Credits** | | | | **90** | **0** | **34** | **112** |
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| **Year III Semester VI** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| 1 | **Theory** | BMA601 | Security in wireless, VOIP and Mobile Apps | 3 | 0 | 0 | 3 |
| 2 | BMA602 | Mobile Testing | 3 | 0 | 0 | 3 |
| 3 |  | BMA621 | Project and Viva-Voce | 0 | 0 | 20 | 10 |
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| **Total Contact Hours and Credits** | | | | **6** | **0** | **20** | **16** |
| **Cumulative Contact Hours and Credits** | | | | **96** | **0** | **54** | **128** |
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**Total Credits: 128**

**Course: Communication Skills**

**Objectives**: To impart good communication skills in the students and give them more confidence in both professional and personal life

**Unit I: Technical vocabulary**

Technical Vocabulary, Punctuation, Numerical Expressions, Expanding Acronyms and Abbreviations, Concord, ‘If’ clauses, Infinitives. Homonyms, Homographs and Homophones, Telephone conversations, Reading Comprehensions, Making of an advertisement

**Unit II Basic skills-reading and speaking skills**

Reading and interpretation, Intensive reading,. Writing reviews on books and films, Descriptions, Process description, Summarizing, Instructions, Oral presentations. Debate.

**Unit III: Basic skill: technical writing skill**

Letters – formal, informal, Cover Letter and CV, Synonyms and Antonyms, Indefinite Adjectives, Non-verbal communication, Interactive sessions. Role Plays, Critical reading, Listening and Note taking.

**Unit IV:  Basic skill: listening and speaking skills**

Active and Passive Voice, Impersonal Passive, Essay Writing, Comprehension Passage, Editing, Correction of errors, Direct and Indirect, Conversations , Dialogue writing, Discourse Markers. Group activities.

**Unit V:   Technical writing and communication**

Reports – Types, structure, data collection, content, form, Definitions, extended definition, Recommendations, Memos, Checklists. Group Discussions, Listening and comprehending the conversations.

**Textbooks:**

1. Department of English, Anna University, Mindscapes, ‘English for Technologists and Engineers’, Orient Longman Pvt. Ltd, Chennai: 2012.
2. Department of Humanities and Social Sciences, Anna University, ‘‘English for Engineers and Technologists’’ Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.
3. M.Ashraf Rizvi, “Effective Technical Communication”,Tata mcGraw-Hill Publishing Company Limited, New Delhi.2009.

**Reference Books:**

1. Sumant. S, ‘Technical English’, Second Edition, McGraw-Hill Education (India) Pvt. Ltd., 2008.
2. Dr. M. Hariprasad,” Communicative English “Third Edition, Neelkamal Publications, PVT. LTD.,2007.
3. Sangeeta Sharma , Binod Mishra, ‘Communication Skills for Engineers and Scientists, PHI Learning Private Limited., New Delhi, 2009.

**Course: Fundamentals of Mathematics**

**Objectives:** To teach students, foundation concepts in Mathematics like Matrices, Set, relations and functions and about Differential Integration and Differentiation and with this background, thus enabling students to perform well in their programming and analytical subjects too.

**Module 1: Matrices**

Types of Matrices, Operations of addition, Scalar Multiplication and Multiplication of Matrices, Determinant of a Square Matrix, Minors and Cofactors, Transpose, adjoint and inverse of a matrix, solving system of linear equations, in two or three variables using inverse of a matrix

**Module 2: Sets, relations and functions**

Definition of Set, Type of Sets, Operations on Sets, Venn diagram, Cartesian Product, Relations, Functions, Types of function, Some elementary functions with their graphs (Exponential, logarithmic, modulus), Limit & continuity of a function (Simple Problems)

**Module 3: Differentiation**

Derivative and its meaning, Differentiation of algebraic, trigonometric, exponential & logarithmic functions, Rules of Differentiation, Differentiation by Substitution, Higher Order Differentiation, Maxima and Minima of Simple Functions

**Module 4: Integration**

Integral as Anti-derivative process, Indefinite Integrals, Rules of Integration, Integration by substitution, Definite Integration, Properties of Definite Integral, Finding areas of Simple Closed Curves

**Module 5: Coordinate Geometry**

2D Cartesian Co-ordinate system, Straight line: (Equation & Slope of a line), Circle: Equation of Circle, Equation to Tangent, Conic Sections: Focus, Eccentricity, Directrix, Axis of a conic section, Parabola & Ellipse: (Definitions, equations and shape of curve only)

**References:**

1. Mathematics for BCA by G. C. Sharma &Madhu Jain, Oscar Publication
2. Mathematics Vol-2 by R. D. Sharma, Dhalpat Raj & Sons
3. The Elements of Co-ordinate Geometry Part-I by S. L. Loney, Book Palace, New Delhi

**Course: Computer Fundamentals and Organization**

**Objectives:** The basic knowledge of how a computer works is very important for any fresh networking or operating system professional. The functional knowledge of a computers working and its main building parts are paramount. The computers of today may come with variety of features but the basic working principles remain the same. Students will explore the fundamentals of organization of a computer and the principles and building units of a computer (its hardware). Also, they will be introduced to the basics of networking and MS Office.

**Module 1: General Features of a Computer**

General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia.

**Module 2: Computer Organization**

Computer organization, central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Input and output units, OMR, OCR, MICR, scanner, mouse, modem.

**Module 3: Computer Hardware and Software**

Computer hardware and software, Machine language and high level language, Application software, computer program, operating system, Computer virus, antivirus and computer security, Elements of MS DOS and Windows OS, Computer arithmetic, Binary, octal and hexadecimal number systems, Algorithm and flowcharts, illustrations, elements of a database and its applications, Basic Gates (Demorgans theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

**Module 4: MS Office**

Word processing and electronic spread sheet, An overview of MSWORD, MSEXCEL and MSPOWERPOINT

**Module 5: Introduction to Networking**

Network of computers, Types of networks, LAN, Intranet and Internet, Internet applications, World Wide Web, E-mail, browsing and searching, search engines, multimedia applications

**Books for Reference:**

1. Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology “O” level made simple, BPB Pub
3. Jain V K (2000) “O” Level Personal Computer software, BPB Pub.
4. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
5. Hamacher, Computer Organization McGrawhill
6. Alexis Leon: Computers for everyone. Vikas, UBS
7. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
8. Sinha. Computer Fundamentals BPB Pub.

**Course: Programming in C**

**Objectives** Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments. The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX operating system. UNIX operating system, C compiler and all UNIX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms. This course focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units. The students will be implementing the concepts explained here to create simple to complex programs.

**Module 1: Overview of Programming:**

**Introduction to computer based problem solving**, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, **Programming environment** – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters

**Module 2: Fundamentals of C programming:**

**Overview of C**, Data Types, Constants & Variables, Operators & Expressions, **Control constructs**-if then, for, while, **Arrays**- single & multidimensional arrays, **Functions**-fundamentals – general form, function arguments, return value, **Basic I/O**-formatted and Unformatted I/O, **Advanced features**- Type modifiers and storage class specifiers for data types, Bit operators, ? Operator, &operator, \* operator, Type casting, type conversion.

**Module 3: Advanced programming techniques:**

**Control constructs**- Do while, Switch statement, break and continue, exit() function, go to and label, **Scope rules**- Local & global variables, scope rules of functions, **Functions**-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi

**Module 4: Dynamic data structures in C:**

**Pointers**- The & and \* operator, pointer expression, assignments, arithmetic, comparison, malloc vs calloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers, **Structures**- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, **Unions** – Declaration, uses, enumerated data-types, typedef

**Module 5: Additional features:**

**File Handling** – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, **C Preprocessor-** #define, #include, #undef, Conditional compilation directives, **C standard library and header files**: Header files, string functions, mathematical functions, Date and Time functions

**Books for Reference**

1. Let us C by Yashwant Kanetka, 6th Edition, PBP Publication
2. The C programming Language by Richie and Kenninghan, 2004, BPB Publication
3. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

**Course: Introduction to Linux**

**Objectives:** The course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications. The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting.

**Module 1: Linux Introduction**

Introduction to Multi user System, History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr, yacc etc. getting Started (Login/Logout) . Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces. **Exploring Linux Flavors -** Introduction to various Linux flavors, Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu. History, Versions, Installation, Features, Ubuntu one, Fedora: History, Versions, Installation, Features.

**Module-2: The Unix File System**

Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.

**Module 3: Unix Process Management**

The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

**Module 4: VI editor**

Vi Editor: Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg, ftp.

**Module 5: System Administration**

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user’s accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command

**Books for Reference**

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
2. Advance UNIX, a Programmer’s Guide, S. Prata, BPB Publications, and New Delhi, 2011
3. Unix Concepts and Applications, Sumitabh Das, 2010
4. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
5. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

**Course: Programming in C Lab**

**List of Programs**

**Part A**

1. Printing the reverse of an integer.
2. Printing the odd and even series of N numbers.
3. Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().
4. Input a string and find the number of each of the vowels appear in the string.
5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
6. Printing the reverse of a string.

**Part B**

1. Searching an element in an array using pointers.
2. Checking whether the given matrix is an identity matrix or not.
3. Finding the first N terms of Fibonacci series.
4. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.
5. Define a structure with three members and display the same.
6. Declare a union with three members of type integer, char, string and illustrate the use of union.
7. Recursive program to find the factorial of an integer.
8. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
9. Arranging N numbers in ascending and in descending order using bubble sort.
10. Addition and subtraction of two matrices.
11. Multiplication of two matrices.
12. Converting a hexadecimal number into its binary equivalent.
13. Check whether the given string is a palindrome or not.
14. Demonstration of bitwise operations.
15. Applying binary search to a set of N numbers by using a function.
16. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

**Course: Linux Laboratory**

**List of Programs**

1. Execute 25 basic commands of UNIX.

2. Basics of functionality and modes of VI Editor.

3. WAP that accepts user name and reports if user is logged in.

4. WAP which displays the following menu and executes the option selected by user:

1. ls 2. Pwd 3. ls –l 4. ps –fe

5. WAP to print 10 9 8 7 6 5 4 3 2 1 .

6. WAP that replaces all “\*.txt” file names with “\*.txt.old” in the current.

7. WAP that echoes itself to stdout, but backwards.

8. WAP that takes a filename as input and checks if it is executable, if not make it executable.

9. WAP to take string as command line argument and reverse it.

10. 1. Create a data file called employee in the format given below:

a. EmpCode Character

b. EmpName Character

c. Grade Character

d. Years of experience Numeric

e. Basic Pay Numeric

$vi employee

A001 ARJUN E1 01 12000.00

A006 Anand E1 01 12450.00

A010 Rajesh E2 03 14500.00

A002 Mohan E2 02 13000.00

A005 John E2 01 14500.00

A009 Denial SmithE2 04 17500.00

A004 Williams E1 01 12000.00

Perform the following functions on the file:

a. Sort the file on EmpCode.

b.Sort the file on

(i) Decreasing order of basic pay

(ii) Increasing order of years of experience.

c. Display the number of employees whose details are included in the file.

d. Display all records with ‘smith’ a part of employee name.

e. Display all records with EmpName starting with ‘B’.

f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.

g.Store in ‘file 1’ the names of all employees whose basic pay is between 10000 and 15000.

h.Display records of all employees who are not in grade E2.

**SEMESTER 2**

**Course: Reasoning and Thinking**

**Objectives: :**It is the objective of the course to introduce to the students, concepts like Reasoning and thinking which are very important for any individual in every aspect and walk of life and assists them in taking the right decisions, approach every problem with diligence and perform action accordingly.

**Module 1: Verbal ability**

Synonyms**,** Antonyms and One word substitutes

**Module 2: Basic quantitative aptitude**

Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.

**Module 3: Logical Reasoning - I**

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism

**Reference Books:**

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007
2. Bajpai, N. Business Statistics, Pearson, 2010
3. Sharma J.K., Business Statistics, Pearson Education India, 2010.
4. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, WestPublishing Company, 1996.
5. CAT Complete course, UPKAR publications

**Course: Operating System**

**Objectives:** The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. This course covers the concept of operating system and its applications.

**Module 1 – Introduction to Operating System**

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

**Module 2 – Process Management**

**Processes**: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, Threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**Module 3: Storage Management**

**Memory Management**: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management**: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation **File-System Interface**: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics **File-System Implementation**: File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery **Disk Managemen**t: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

**Module 4: Protection and Security**

**Protection**: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Acess Matrix, Revocation of Access Rights, Capability- Based Systems, Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

**Books for Reference**

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,6th Edition,WSE (WILEY Publication)
4. William Stallings, Operating System, 4th Edition, Pearson Education.
5. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
6. Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
7. Nutt: Operating Systems, 3/e Pearson Education 2004

**Course: OOPS with C++**

**Objectives:** The main objective is to learn the basic concept and techniques which form the object oriented programming paradigm. Object-oriented programming is a new way of thinking about problem using models organizes around real world concept. The Fundamental construct is the object which combines both data-structure and behaviour in a single entity which is in contrast to conventional programming in which data-structure and behaviour are loosely connected.

**Module 1: Introduction**

Evolution of programming methodologies-Procedure oriented versus Object Oriented Programming-characteristics of OOP, Basics of OOP, Merits and Demerits of OOP. **Data Types:** Different data types, operators and expressions in C++, Keywords in C++. **Input and Output:** Comparison of stido.h and iostream.h, cin and cout. **Decision and loop:** Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and goto statements, Looping statements- for loop, while loop, Do-while loop. **Arrays, String and Structures :** fundamentals-Single dimensional, multi-dimensional arrays, fundamentals of strings, different methods to accept strings, different string manipulations, array of strings, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and Unions, Enumerated data types-declaration and their usage.

**Module 2:**

**Class:** Definition-defining the class, defining data members and member functions, Access specifier-private, public, protected, objects as function arguments, returning objects from the function, scope resolution operator, member function defined outside the class, difference between class and structure, array as class member data, Array of objects. **Functions in C++ :** Function definition, function declaration, Built-in functions, user defined functions, calling the function, passing parameter-actual and formal, different methods of calling the function call by value, call by reference using reference as parameter and pointer as parameter, overload function-different types of arguments-different number of arguments, inline function, default argument, storage classes-automatic, external, static, register. **Constructor and Destructor:** Constructors-constructor with argument, constructor without arguments, constructor with default arguments, Dynamic constructor, constructor overloading, copy constructor, destructors, Manipulating private data members.

**Module 3:**

**Operator overloading:** Defining operator overloading, overloading unary operator, overloading binary operator, manipulation of string using overloaded operator, rules for overloading operator. Data conversion: conversion between Basic types, conversion between objects & Basic types, conversion between objects of different classes. **Inheritance:** Base Class & derived class, defining derived classes, protected access specifier, public inheritance and private inheritance-member accessibility, constructors and destructors in derived classes, Level of inheritance-single inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance.

**Module 4:**

**Pointer:** Pointer declaration and Access, Pointer to void, pointer and arrays, pointer constant and pointer variable, pointer and functions, pointer, call by pointer arrays, array of pointers to string, printer sort, memory management-new and delete, pointer to object-referencing members using pointers, self containing class, this pointer, returning values using this pointer.  **Virtual function:** Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract class, virtual base class. **Friend functions and static function:** Purpose, defining friend functions, friend classes, static function, accessing static function numbering positive objects.

**Module 5:**

**Templates and Exception Handling:** Introduction to templates, class templates, function templates, Member function templates, Template arguments, Exception handling. **Console IO Operator :** C++ stream and C++ stream classes, unformatted I/O operators, formatted I/O operators-manipulators-user defined manipulators. **Files :** Class for file stream operators, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple object, stream class, file pointer-specifying the position, specifying the object, tellg() function, seekg() function. Command line arguments.

**Books for References:**

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications
2. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
3. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications
4. Lippman: C++ Primer, 3/e Pearson Education
5. C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.
6. Let us C++ by Yeshwanth Kanetkar

**Course: Data Structures using C**

**Objectives:** A data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently. Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks. This course covers the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.

**Module 1: Introduction to Data structures**

Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

**Module 2: Searching and Sorting**

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort

**Module 3: Stack and Queue**

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque) , Priority queue , Operations on all types of Queues

**Module 4: Linked List**

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

**Module 5: Tree Graphs and their Applications:**

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

**Books for References:**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum’s outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using ‘C’
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**Course: OOPS with C++ Lab**

**Part A**

1. Number of vowels and number of characters in a string.
2. Write a function called zeros maller () that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a man() program to access this function.
3. Demonstration of array of object.
4. Using this pointer to return a value ( return by reference).
5. Pointer sort.
6. Demonstration of virtual function.
7. Demonstration of static function.
8. Accessing a particular record in a student's file.

**Part B**

1. Using different methods to write programs to implement function overloading with default arguments for the following problems :
2. To find whether a given number is prime.
3. To find the factorial of a number
4. Write a program to create a database for a bank account contains Name, Account no, Account type, Balance, Including the following a) Constructors b) destructors call) default constructors d) input and output function ; input and output for 10 people using different methods.
5. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.
6. Write a program to overload the following operators (any 3)
7. Binary operator '+' to concatenate 2 strings
8. Relational operator '<' to find whether one data is less than the other
9. Unary operator '++' to find the next date of a given date.
10. Create a base class for a stack and implement push and pop operation. Include a derived class to check for stack criteria such as a) stack empty b)stack full c) stack overflow d) stack underflow.
11. Create a database using concepts of files for a student including the following fields : Student- name, Student's Reg No, Student's Attendance (overall % of attendance); and enter data for 10 students and output the same in proper format.
12. Using operator overloading concept implement arithmetic manipulation on two complex numbers.

**Course: Data Structures using C Lab**

**List of Programs**

**Part A**

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

**Part B**

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.

6. Sort N numbers using merge sort.

**SEMESTER 3**

**Course: Information Security Fundamentals**

**Objectives:** This course enables the students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. And also to get familiarized with Asset management along with the objective to create awareness in Digital Rights management.

**Module 1: Introduction to Information Security**

Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System; Balancing Information Security and Access; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

**Module 2: The Need for IT Security**

Business Needs-Protecting the functionality, Enabling the safe operations, Protecting the data, safe guarding the technology assets; Threats-compromises to Intellectual property, deliberate software attacks, Espionage and trespass, sabotage and vandalism; Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering.

**Module 3: Risk Management**

Definition of risk management, risk identification, and risk control, Identifying and Accessing Risk, Assessing risk based on probability of occurrence and likely impact, the fundamental aspects of documenting risk via the process of risk assessment, the various risk mitigation strategy options, the categories that can be used to classify controls.

**Module 4: Network Infrastructure Security and Connectivity**

Understanding Infrastructure Security- Device Based Security, Media-Based Security, Monitoring and Diagnosing; Monitoring Network- Firewall, Intrusion Detection System, Intrusion Prevention system; OS and Network Hardening, Application Hardening; Physical and Network Security- Policies, Standards and Guidelines.

**Books for References:**

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
2. Operating System Concepts, 8th Edition by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Pub: John Wiley & sons, Inc., 2009.
3. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011

**Course: Software Engineering**

**Objectives:** Software engineering incorporates various accepted methodologies to design software. This subject gives a detailed description of the entire process of developing a software project and also the issues associated after development. This course covers the introductory concepts of software engineering and its design

**Module 1: Software Product and Process**

Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.

**Module 2: Software Requirements**

Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary.

**Module 3: Analysis, Design Concepts and Principles**

Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

**Module 4: Testing**

Taxonomy of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques

**Module 5: Software Project Management**

Measures And Measurements – ZIPF’s Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools

**Text Books:**

1. Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007
2. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005

**Course: Relational Database Management Systems**

**Objectives:** A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model. RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more. The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

**Module 1: Introduction**

Purpose of Database System -– Views of data – Data Models – Database Languages –– Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model ) – E-R Diagrams -- Introduction to relational databases

**Module 2: Relational Model**

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL. Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

**Module 3: Database Design**

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

**Module 4: Transactions**

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

**Text Books:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.

**Course: Computer Networks Fundamentals**

**Objectives:** The focus of this unit is providing a background to the basics of networking and its underlying principles. The learners taking this unit will explore the fundamentals of networking, the principle and purpose behind layered models, devices used in networks and their wireless connectivity and the ways to troubleshoot network related issues. The unit underpins the principles of networking and enables the learners to work towards taking up vendor certifications in the networking domain. This course enables learners to understand computer networking concepts, how they work, how they operate and the protocols, standards and the models associated with networking technology and their troubleshooting mechanisms.

**Module 1: Networking Fundamentals**

Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture- Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, media connectors (Fiber optic, Coaxial, and TP etc.) Introduction of OSI model, Seven layers of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, TCP, UDP, IP, ICMP, ARP/RARP, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses

**Module 2: Basics of Network Devices**

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, and modem, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components,Point-to-Point Protocol(PPP ),PPP standards, Address Resolution Protocol, Message format, transactions, Wireless Networking: Wireless Technology, Benefits of Wireless Technology, Types of Wireless Networks: Ad-hoc mode, Infrastructure mode, Wireless network Components: Wireless Access Points, Wireless NICs, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless LAN modulation techniques, wireless security Protocols: WEP,WPA, 802.1X, Installing a wireless LAN

**Module 3: Basics of Network, Transport and Application Layers**

Network Layer: Internet Protocol (IP ), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP Address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, Internet Control Message Protocol (ICMP ), ICMPv4, ICMPv6, Internet Group Management Protocol (IGMP ),Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP

**Module 4: WAN Technology**

What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fiber, Cellular Technologies, Connecting LANs : Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation, Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Other Security Appliances, Security Threats

**Module 5: Network Operating Systems and Troubleshooting Network**

Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools

**Books for References:**

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
3. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
4. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

**Course: Programming in JAVA**

**Objectives:** Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent. The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc. Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones. This unit focuses on the concepts of object oriented programming language and the different constructs for creating applications in java. This course provides students with an understanding of the object oriented concepts which helps in the field of programming, management of data, etc. and of Java programming which helps to explore the object oriented nature of the language and the multi-platform versatility offered by it.

**Module 1: Introduction**

History, Overview of Java, Object Oriented Programming, A simple Program, Two control statements - if statement, for loop, using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words. Data types: Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays. **Operators:** Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements.

**Module 2: Classes:**

Class Fundamentals, Declaring objects, Assigning object reference variables, Methods, constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods, using objects as parameters, Argument passing, Returning objects, Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments. Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance.

**Module 3: Packages**

Definition, Access protection importing packages, Interfaces: Definition implementing interfaces. Exception Handling: Fundamental, Exception types, Using try and catch, Multiple catch clauses, Nested try Statements, throw, throws, finally, Java’s Built - in exception, using Exceptions.

**Module 4: Multithreaded Programming**

The Java thread model, The main thread, Creating a thread, Creating multiple thread, Creating a thread, Creating multiple threads, Using isalive() and Join(), Thread - Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi threading. 1/0 basics, Reading control input, writing control output, Reading and Writing files, Applet Fundamentals, the AWT package,AWT Event handling concepts The transient and volatile modifiers, using instance of using assert.

**Module 5: JAVA Database Connectivity (JDBC)**

Database connectivity: JDBC architecture, JDBC Drivers, the JDBC API: loading a driver, connecting to a database, Creating and executing JDBC statements, Handling SQL exceptions, Accessing result sets: Types of result sets, Methods of result set interface. An example JDBC application to query a database

**Books for Reference:**

1. The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

**Course: Relational Database Management Laboratory**

**List of experiments**

1. Create User in Oracle Database and grant and revoke the privileges and use of commit savepoint roleback command.
2. Create the following:

* Synonym sequences and Index
* Create alter and update views.

1. Create PL/SQL program using cursors, control structure, exception handling
2. Create following:

* Simple Triggers
* Package using procedures and functions.

1. Create the table for

* COMPANY database
* STUDENT database and Insert five records for each attribute.

1. Illustrate the use of SELECT statement
2. Conditional retrieval - WHERE clause
3. Query sorted - ORDER BY clause
4. Perform following:

* UNION, INTERSECTION and MINUS operations on tables.
* UPDATE, ALTER, DELETE, DROP operations on tables

1. Query multiple tables using JOIN operation.
2. Grouping the result of query - GROUP BY clause and HAVING clause
3. Query multiple tables using NATURAL and OUTER JOIN operation.

**Course: Java Programming Laboratory**

**List of experiments**

**Part A**

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

**Part B**

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number f lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a textfileld that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

**SEMESTER 4**

**Course: Mobile Web and Application Development**

**Course Objective:** The rapid growth of the internet and mobile devices has had an enormous impact on the ways that companies conduct their business. Mobile web applications refer to web applications on mobile devices, aimed at personalizing, integrating, and discovering mobile contents in user contexts. Mobile web applications are built upon the emergence of the web standard, the advance of the mobile networking technology, and the rise of the Smartphone mobile device platform.

This unit focuses on the mobile web applications, their use, advantages and disadvantages. Usage of Python, client-side and server-side web technologies and web services are also discussed in this unit.

**Module 1: Mobile Application Principles**

Mobile Application Development Paradigm, What is an application?, Mobile Application, Programming rules and Challenges. Mobile Programming Tools, Mobile Application Evolution, Thin Client, Fat Client, Future of Mobile App Development

**Module 2: Mobile Programming Languages and Practices**

Mobile App Programming in Java, Introduction to Java, Java Compiler, Java Interpreter, Advantages of Java, Disadvantages of Java, Programming Methodology.

Mobile App Programming in C++, Introduction to C++, Symbian C++, Microsoft embedded VC++. Mobile Programming best practices, User Analysis, Organizational Analysis

**Module 3: Mobile platform and NW environment**

Mobile App Testing Environment, OTA App Provisioning, Mobile Applications: What is Web App?, Context of Mobile Applications, Pros and Cons of Mobile Web App, SIM based Mobile App Development, What is SIM?, SIM as a Platform, SIM as Service Differentiator, Introduction to UI, Principles for UI development

**Module 4: Architecture**

World Wide Web, Basics of WWW, Web Application, Web Application Architecture, Web Server, Web Server Features, Web Application Server, Web Technologies and Standards: HTTP, HTML, HTML Tags, CSS (Cascading Style Sheets), XML, introduction to Cookies. Dynamic Web Pages and CGI Script, Java Script and Java Script Features, Java Servlets, Java Web Components, J2EE MVC Framework, PHP, AJAX and AJAX Standards

**Module 5: Web Architecture, Standards and Tools**

Mobile Internet Access, Mobile Web browser Evolution, Mobile Web Standards and development time, WAP and WAP Standards, XHTML, WML and WMLScript, Mobile Web Development Approaches. Content Adaption and Adaption Strategies, How to recognize end user device, Device Detection in PHP. Tools Available for mobile web development, Conversion Engines, Emulators, Mobile Web Checkers

**Reference Books:**

1. Professional Mobile Application Development by [Jeff McWherter](http://www.amazon.com/Jeff-McWherter/e/B004D4FGQM/ref=ntt_athr_dp_pel_1), [Scott Gowell](http://www.amazon.com/Scott-Gowell/e/B0073I3SA6/ref=ntt_athr_dp_pel_2), 2012
2. Mobile Computing Principles: Designing and Developing Mobile Applications by Reza B'Far, Cambridge University, 2005
3. Mobile Applications: Architecture, Design, and Development by Valentino Lee, Heather Schneider and Robbie Schell, Pearson Education, 2004

**Course: Ethical Hacking Fundamentals**

**Objectives:** The course primarily covers the Ethical hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System hacking techniques and a broad knowledge about white box and black box testing. The Unit describes a wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session hijacking and severe vulnerabilities that can be seen in Web Applications. The Unit also covers hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls. The Unit not only captures valuable information on vulnerabilities and threats but also covers an effective way of report making methodology that can helps the top level management to take immediate decisions on mitigating the threats. The course enables students to better understand the Ethical hacking concepts and various phases of hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques. To familiarize them with the wide range of attacks in a Networking environment and to enable him/her to prepare a well- defined vulnerability reporting procedure along with the remediation techniques.

**Module 1: Introduction to Ethical Hacking**

Hacking Methodology, Process of Malicious Hacking, Footprinting and Scanning: Footprinting, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques

**Module 2: Hacking Methodology**

Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

**Module 3: Web and Network Hacking**

SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

**Module 4: Report writing & Mitigation**

Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

**Books for References:**

1. The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking, by Ronald L. Krutz (Author), Russell Dean Vines, Wiley Publications, First Edition

**Course: Cryptography Fundamentals**

**Objectives:** Security is ubiquitous. With the advent of e-commerce and electronic transactions, the need for development of secured systems has grown tremendously. Cryptography is the study of building ciphers to ensure the confidentiality and integrity of information. Along with it is the activity of analyzing the strength of a cipher by subjecting it to several forms attack. This course covers the basic concepts of Cryptography, certain cryptographic algorithms and its applications.

**Module 1: Introduction to Cryptography**

The Confidentiality, Integrity & Availability (CIA) Triad, Cryptographic concepts, methodologies &practices, Symmetric& Asymmetric cryptography, public& private keys, Cryptographic algorithms and uses, Construction& use of Digital signatures

**Module 2: Types of Algorithms**

The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography & Quantum Cryptography

**Module 3: Key Management**

The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery and life span and how these functions affect cryptographic integrity

**Module 4: Application of Cryptography**

Major key distribution methods and algorithms including Kerberos, ISAKMP etc., Vulnerabilities to cryptographic functions, the Use and functions of Certifying Authorities (CAs),Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions

**Books for Reference:**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Cryptography and Security by C K Shyamala, N Harini and Dr T R Padmanabhan – Wiley Publications, First Edition

**Course: Basic Android**

**Objectives:** Android is a comprehensive open source platform designed for mobile devices. It is championed by Google and owned by Open Handset Alliance. The goal of the alliance is to “accelerate innovation in mobile and offer consumers a richer, less expensive, and better mobile experience.” Android provides all the tools and frameworks for developing mobile apps quickly and easily. The Android SDK is all you need to start developing for Android. Android OS can be found in a series of mobile devices currently.

This unit focuses to provide a conceptual understanding of android programming including design principles, practical implementation and development skills for programmer. On completion of this unit the learner should be able to design and implement a variety of basic Android Apps.

**Module 1: Introduction to Android**

Introduction to Android Architecture: Introduction, History, Features and Android Architecture. Android Application Environment, SDK, Tools: Android Studio, Application workflow. Programming paradigms and Application Components - Part 1: Application Components, Activity - start, stop, resume, restart and recreate, Manifest File, Programming paradigms and Application Components Part 2: Intents, Content providers, Broadcast receivers, Services

**Module 2: User Interface Design**

User Interface Design part 1: Views &View Groups, Views : Button, Text Field, Radio Button, Toggle Button, Checkbox, Spinner, Image View, Image switcher, Event Handling, Listeners, Layouts : Linear, Relative, List View, Grid View, Table View, Web View, Adapters. User Interface Design part 2: Menus, Action Bars, Notifications : Status, Toasts and Dialogs, Styles and Themes, Creating Custom Widgets, Focus, Touch Mode, Screen Orientation. Android design principles, Material design - animation, components, style, layout, patterns, and usability, Designing for Tablets – Working with tablets: Developing for different android platform versions, languages and screens, Fragments, Manipulating objects with drag and drop, Optimizing applications for high screen resolution, combining fragments into a multilane UI, flexible UI. Resources, Assets, Localization: Resources and Assets, Creating Resources, Managing application resources and assets, Resource-Switching in Android. Localization, Localization Strategies, Testing Localized Applications, Publishing Localized Applications

**Module 3: Mobile Data Management**

Content Providers: Contents provider, Uri, CRUD access, Browser, CallLog, Contacts, Media Store, and Setting. Data Access and Storage: [Shared Preferences](http://developer.android.com/guide/topics/data/data-storage.html#pref), Storage External, [Network Connection](http://developer.android.com/guide/topics/data/data-storage.html#netw). SQLite - [SQLite Databases](http://developer.android.com/guide/topics/data/data-storage.html#db), Saving data - Key-value sets, files, SQL databases, Content sharing - data, files and files with NFC

**Module 4: Native Capabilities, Multimedia and Maps**

Camera, Audio, Sensors and Bluetooth: Taking photos, recording videos, Controlling Camera, Android Media API: Playing audio/video, Managing audio playback, focus and output hardware, Media recording, Printing content. Sensors -Sensor manager, listener, Accelerometer, Android Gestures. Bluetooth. Maps & Location: Location API, GPS, Working with Location Manager, Working with Google Maps extensions, Maps via intent and Map Activity, Location based Services. Location Updates, Location Providers, Selecting a Location Provider, Finding Your Location, Map - Based Activities, How to load maps, To finding map API key, Google Play Services.

**Module 5: Testing and Commercialization**

Testing: Testing and Commercializing Applications - Basics of Testing, Testing from an IDE (Eclipse), Activity testing, Service testing, Content provider testing, Test Classes, Debugging using DDMS, How to get your app on the app store, Automating UI tests, Building effective unit tests, Commercializing apps - regulatory issues, ownership and licensing issues, IP associated with a successful app, legal issues, Using Google Play to distribute and monetize - Monetize premium and freemium apps, monetize with subscription, e-commerce - Android Pay, AdMod Ads, User value and Analytics.

**Books for References:**

1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012
3. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
4. Beginning Android 4, by Grant Allen, Apress, 2011
5. Android Studio Application Development by [Belén Cruz Zapata](http://www.amazon.in/Bel%C3%A9n-Cruz-Zapata/e/B00NS0KX9W/ref=ntt_athr_dp_pel_1)
6. Android by Example using Android Studio by [Daniel Black](http://www.amazon.in/s/ref=ntt_athr_dp_sr_1?_encoding=UTF8&field-author=Daniel%20Black&search-alias=digital-text&sort=relevancerank)
7. Android For Beginners. Developing Apps Using Android Studio, by [Barbara Hohensee](http://www.amazon.in/Barbara-Hohensee/e/B00Q5D90HA/ref=ntt_athr_dp_pel_1), [Amit Dilip Dharma](http://www.amazon.in/s/ref=ntt_athr_dp_sr_2?_encoding=UTF8&field-author=Amit%20Dilip%20Dharma&search-alias=digital-text&sort=relevancerank)(Translator)

**Course: Mobile Architecture and App Development**

**Course Objective:**Usage of mobile devices have increased exponentially over the past decade. Most of the people have more than one mobile devices. The introduction of Smart Phones have created a new revolution in the telecommunication industry. The rise in demand of mobile phones have led telecommunication companies to delve into newer technologies and standards. This course covers the basics of mobile network, device and their architecture. It explains the importance of developing quality applications - both native as well as web-based. The course explains about the importance, features, functions and types of mobile operating systems.

**Module 1 : Mobile Network Architecture**

Wireless Communication Principles, Network Evolution, Radio Communication, Analog and Digital Communication, Computer Network, OSI Model, Mobile Network OSI layer functions, Mobile Network Protocol Layers, Telephony Networks, PSTN, Telecommunication Networks, Fixed Networks, Mobile Networks, Cellular Network Concepts, Cellular Networks, Cells and Base Stations, Frequency and Interface in Cells, Mobile Network Architecture,Wireless Network Generations, GSM, GPRS.

**Module2 : Mobile Device Architecture**

Mobile Phone Evolution, Mobile Handset Characteristics, Bluetooth , Display, Keypad, Camera, Mobile Handset Categories, Handset Components, Handset Design, Handset hardware architecture, Elements inside a Mobile Handset, Hardware Architecture Evolution, Hardware architectural trends, CPU and Memory, Internal storage, Handset Power Requirements, Power Management, Introduction and Definition to the SIM, Functions and usage of the SIM, Phones without SIMs, Key Handset software components, Device Drivers.

**Module3 : Mobile Application Development**

Mobile Application Development Paradigm, Mobile Programming Tools, Mobile Application Evolution, Thin Client, Fat Client, Future of Mobile App Development, Mobile Client Server App Architecture, Mobile App Programming in different languages, Mobile Programming best practices,Pros and Cons of Mobile Web App, SIM based Mobile App Development, SIM as a Platform, SIM as Service Differentiator, Evolution of Mobile Services, Types of Mobile Services, App Server, Mobile Context of AS, AS Deployment Architecture, App Server Layers.

**Module4 : Mobile Web Application**

World Wide Web, Web Application, Web Application Architecture, Web Server, Web Server Features, Web Application Server, Mobile Internet Access, Mobile Web browser Evolution, Mobile Web Development Approaches, Dynamic Content, RSS, Feed, Mobile Advertising Motivation, Dynamic Mobile Advertising, Web Service Architecture, Users on the Go, Best Development Practices.

**Module5 : Mobile Operating System**

Introduction to Mobile Operating Systems and why they are needed, Open Platforms, Mobile OS Features, Symbian, BlackBerry, Android, iOS, Windows, Tizen, Ubuntu, etc.

**Reference Books:**

1. Wireless and Mobile Network Architectures by Yi-Bang Lin and Imrich Chlamtac, Wiley-India, 2008
2. Mobile Networks Architecture by [Andre Perez](http://www.amazon.com/Andre-Perez/e/B004SJUOH8/ref=ntt_athr_dp_pel_1), Wiley, March 2012
3. Mobile Computing – Technology, Application & Service Creation by Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, Tata McGraw-Hill, 2005
4. GSM - Architecture, Protocols and Services by [Jörg Eberspächer](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22J%C3%B6rg+Ebersp%C3%A4cher%22), [Hans-JoergV ögel](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Hans-Joerg+V%C3%B6gel%22), [Christian Bettstetter](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Christian+Bettstetter%22), [Christian Hartmann](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Christian+Hartmann%22) John Wiley & Sons,  Dec-2008
5. Mobile Handset Design by Sajal K. Das, John Wiley and Sons, 2010
6. Smart Phone and Next Generation Mobile Computing by Pei Zheng and Lionel M. Ni., Morgan Kaufmann, 2006
7. Professional Mobile Application Development by [Jeff McWherter](http://www.amazon.com/Jeff-McWherter/e/B004D4FGQM/ref=ntt_athr_dp_pel_1), [Scott Gowell](http://www.amazon.com/Scott-Gowell/e/B0073I3SA6/ref=ntt_athr_dp_pel_2), 2012
8. Mobile Computing Principles: Designing and Developing Mobile Applications by Reza B'Far, Cambridge University, 2005
9. Mobile Applications: Architecture, Design, and Development by Valentino Lee, Heather Schneider and Robbie Schell, Pearson Education, 2004
10. Mobile Web Development by Nirav Mehta, Packt Publishing, 2008
11. Next Generation Wireless Applications: Creating Mobile Applications in a Web 2.0 and Mobile 2.0 World by Paul Golding, John Wiley & Sons, 2008
12. Head First Mobile Web by [Lyza Danger Gardner](http://www.amazon.com/Lyza-Danger-Gardner/e/B006NZEHHS/ref=ntt_athr_dp_pel_1), [Jason Grigsby](http://www.amazon.com/Jason-Grigsby/e/B006MVI74C/ref=ntt_athr_dp_pel_2), 2011

**Course: Introduction to Cloud Computing**

**Objectives:** Cloud computing is a colloquial expression used to describe a variety of different computing concepts that involve a large number of computers involves a large number of computers that are connected through a real-time communication network. In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time. This course covers basic concepts of cloud types, services and security etc.

**Module 1: Introduction**

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

**Module 2: Cloud Computing Companies and Migrating to Cloud**

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

**Module 3: Cloud Cost Management and Selection of Cloud Provider**

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

**Module 4: Governance in the Cloud**

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

**Module 5: 5 ten cloud do an do nots.:**

Don’t be reactive,do consider the cloud a financial issue, don’t go alone, do think about your architecture, don’t neglect governance, don’t forget about business purpose, do make security the centerpiece of your strategy, don’t apply the cloud to everything, don’t forget about Service Management, do start with a pilot project.

**Reference Books:**

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

**Text Books:**

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

**Ethical Hacking Laboratory**

**List of experiments:**

1. Passive Reconnaissance using “Who is” and Online tools
2. Active Reconnaissance using “Sampad” and web site details
3. Full Scan, Half Open Scan and Stealth scan using “nmap”
4. UDP and Ping Scanning using “Advance Lan Scanner” and “Superscan”
5. Packet crafting using “Packet creator” tools
6. Exploiting NetBIOS vulnerability
7. Password Revelation from browsers and social networking application
8. Creating and Analyzing spoofed emails
9. Creating and Analyzing Trojans
10. OS password cracking

**Basic Android Laboratory**

**List of experiments:**

1. Display Hello World
2. Add two Edit Text. When a number is entered in Edit Text 1, the square of that number should be displayed in Edit Text 2.
3. Add an Edit Text and a button. When the button is clicked, the text inputted in Edit Text should be retrieved and displayed back to the user.
4. Add two Edit Text and a button. When the button is clicked, the text inputted in Edit Text 1 should be retrieved and displayed in EditText2.
5. Program a calculator
6. Create a Unit convertor for height
7. Create a Unit convertor for height and weight in the same application. Selection of height/weight can be done using a spinner.
8. Add a spinner. When the spinner is selected, there should be three options (e.g., android, java, testing). When you click on each option, it should go to another page containing some other components. Each of these pages should have a “back” button, which on pressing will take you back to the page with the spinner.
9. Create applications to include ActionBar, Menus, Dialogs and Notifications
10. Create a user login form and registration form. First time users have to register through the registration form and the details should be stored in the database. Then they can login using the login page.
11. Create a camera application, where you can click a picture and then save it as the wallpaper.
12. Create a media player which plays an mp3 song.
13. Create a media recorder which will record the sound.
14. Testing applications

**SEMESTER 5**

**Course Name: Computer Forensics-an Investigation**

**Objectives:** Computer Forensics deals with the development of tools and software to gather evidences from computers, without corrupting the information contained. A relatively new field, it is quickly gaining momentum as the complexities in the crimes are on the rise and it has become imperative to treat each cybercrime with diligence. Students are taught about different forms of cybercrime and its implications and duties of professionals employed at different levels towards analyzing and controlling cybercrime. Methods to recover data from storage devices are covered in following chapters. Different forensic techniques and cyber laws are also dealt in detail.

**Module 1: Computer Forensics**

Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure

**Module 2: Storage Devices & Data Recover Methods**

Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, Head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques

**Module 3: Forensics Techniques**

Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – Header option of SMTP, POP3, IMAP

**Module 4: Cyber Law**

Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment)

**Books for References:**

1. Guide to Computer Forensics and Investigations by Nelson

**Course Name: Virtualization and Cloud Security**

**Objectives:** Server virtualization is today’s most rapidly-evolving and widely-deployed technologies. Highly beneficial to organizations in terms of cost and ease of deployment and management of virtualized servers, deploying desktop, application and network virtualization is in demand. Beginning from basics of virtualization and Cloud Security, students proceed to more detailed topics in Cloud like Cloud Trust Protocol & Transparency and Cloud Controls Matrix.

**Module 1: Introduction to Virtualization & Cloud**

Virtualization and Cloud computing concepts, Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts, Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between Guest instances, Security between Hosts and Guests

**Module 2: Cloud Security**

Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol, Cloud Controls Matrix. Complete Certificate of Cloud Security Knowledge (CCSK)

**Module 3: Cloud Trust Protocol & Transparency**

Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Concepts, Security, Privacy & Compliance aspects of cloud

**Module 4: Cloud Controls Matrix &Top Cloud Threats**

Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model, requirements of Security as a Service (Secaas) model and Top Security threats to the cloud model

**Books for References:**

1. Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines

**Course Name: IT Governance, Risk and Information Security Management**

**Objectives:** The unit primarily covers the importance of IT and IS Governances and the best practices followed by the Role of Steering committee and Chief Information Security Officer. The Unit also deals with the Risk management and the Information Security Management Practices including Hiring, Training, Promotion, Performance Evaluation, Required Vacations and Termination Policies, Sourcing Practices and Strategy for Information Security. The Unit also covers the Committee of Sponsoring Organizations and its importance and applicability, Sarbannes Oxley Act and its implications to the Industry.

**Module 1: IT Governance**

Introduction & Concepts, Role of Governance in Information Security, Best Practices for IT Governance. Role of IT Strategy Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA

**Module 2: Information Systems Strategy**

Role of Strategic Planning for IT, Role of Steering committee, Policies and Procedures

**Module 3: Risk Management Program**

Develop a Risk Management Program. Risk Management Process. Risk Analysis methods. Risk-IT Framework of ISACA

**Module 4: Information Security Management**

Introduction, Performance Optimization, IT Security roles & responsibilities, Segregation of Duties, Description of COBIT and other Frameworks

**Books for References:**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

**Course Name: Mobile Ecosystem, Business Analysis and Models**

**Objectives:** Mobile industry is witnessing exponential growth year by year with the introduction of a variety of devices and services. So, the industry should possess characteristics which will enable them to handle the fast growth of the number of users, new technologies and the volatile environment, i.e. the mobile ecosystem has a set of players and a constantly changing environment. This rapid change started with the introduction of Smartphone. The role of each player in the ecosystem is uncertain. They can be contributing to various areas at different times.

The organizations use different business models to develop the mobile ecosystem. There cannot be a single business model for all the organizations. Business model will be providing a description of the roles and relationships of the company, customers, partners, suppliers, etc.

This unit focuses on mobile ecosystem from the business perspective, the different business models that can be implemented and a set of case studies of the current mobile ecosystem.

**Module 1: Understanding Business Models and Ecosystem**

Business ecosystems, Methodological Approach, Ecosystem Evolution, Value chains, Business Models

**Module 2: Overview of Mobile Market**

Mobile ecosystem, Global mobile ecosystem, Mobile ecosystem in India, Impact of Open Source, Open Source Operating Systems Vs. Proprietary Operating Systems – Cost Effectiveness.

**Module 3: Mobile Application Monetization**

Prevailing Business Models, Disruption and Innovation, Trends, Monetizing App: free and paid apps, app store search, advertising, e-mail marketing, types of apps, native or cross platform apps.

**Module 4: Mobile Marketing and Advertising**

Mobile Marketing, M-Coupons, Mobile Advertising: Mobile advertising and search, mobile products and service offerings, incentives and loyalty programs, banner display ads, interstitial ads, in-content ads, ads to download other apps, making money with ads, app advertising, ad networks vs. media owners. affiliate marketing, Case studies on Google and Apple Ecosystem.

**Module 5: M-Commerce and Ecosystem Case Studies**

M-commerce: future of mobile marketing, mobile sites, services, benefits, mobile banking, mobile purchase, m-commerce apps, challenges. Case Studies: Ecosystem of a Mobile Application Development Company, Ecosystem of a Device Manufacturer.

**Reference Books:**

1. Mobile Marketing - How technology is revolutionizing marketing, communications and advertising, by Daniel Rowles, 2014
2. Mobile Design and Development Practical concepts and techniques for creating mobile sites and web apps, by [Brian Fling](http://shop.oreilly.com/product/9780596155452.do#tab_04), O'Reilly Media, 2009
3. M-Commerce, by [Paul Skeldon](http://www.amazon.in/Paul-Skeldon/e/B0034OH27S/ref=dp_byline_cont_book_1), 2013
4. Mobile Advertising: Supercharge Your Brand in the Exploding Wireless Market – 2008, by [Chetan Sharma](http://www.amazon.in/Chetan-Sharma/e/B001H6GYRE/ref=dp_byline_cont_book_1), [Joe Herzog](http://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Joe+Herzog&search-alias=stripbooks), [Victor Melfi](http://www.amazon.in/s/ref=dp_byline_sr_book_3?ie=UTF8&field-author=Victor+Melfi&search-alias=stripbooks), 2013
5. Mobile App Marketing and Monetization, by Alex Genadinik, 2014

**Course Name: Advanced Android**

**Objectives:** Android is a comprehensive open source platform designed for mobile devices. It is championed by Google and owned by Open Handset Alliance. The goal of the alliance is to “accelerate innovation in mobile and offer consumers a richer, less expensive, and better mobile experience.” Android provides all the tools and frameworks for developing mobile apps quickly and easily. The Android SDK is all you need to start developing for Android. Android OS can be found in a series of mobile devices currently.

This unit focuses to provide an advanced level of understanding of android programming including services, networking, third party apps, multimedia and graphics, web application etc. this unit also informs the learner how to commercialize the applications developed by them.

**Module 1: App Development Topics**

Services: Services and Notifications – bound/unbound services, Starting and stopping services, Android Interface Definition Language, Handler and Messenger, Passing objects over IPC, Scheduling of services, Remote service communication, Background processing using handlers, AsyncTask and Loaders, Setting up notifications, Notification manager,Networking: Introduction Android networking capabilities, Android SDK networking packages, Android Socket programming, Proxy Settings, Broadcasting, SMS application using Broadcast Receiver. Managing network usage, Android Xml remote procedure calls on android, what is XML-RPC, History, Data types, using [web services](http://www.helloandroid.com/tutorials/xml-remote-procedure-calls-android) on android phones. Integrating with Embedded Applications: Embedded Apps: Telephony, SMS, etc.

**Module 2: Graphics & Animation**

Graphics & Multimedia – Introduction to Graphics, displaying bitmaps, displaying graphics with OpenGL ES, defining and drawing shapes, projection, motion, response to touch events, Animating views - Scenes and Transitions, Frame Animations, Tween Animation, scale, rotate, translate, alpha, Interpolation, Canvas/Drawing into a view, Surface View/Surface Holder, Adding animations - Crossfading two views, ViewPager, card flip, zooming a view, animating layout changes

**Module 3: Threads & Processes**

Tasks & Processes: Tasks, Switching between Task, Process, Process lifecycle.Threads, Thread Life cycle, Worker Threads, Thread Handlers, Threads & Loopers and IPC.Using network service discovery, P2P connections,

**Module 4: Web Applications**

Web Apps & Web Services: Web Applications - Web View, ViewPort, Page navigation, Debugging web applications Web Services – Android Server Communication: communication protocols, interacting with server-side applications, develop clients for web services, Exchanging Data over the Internet, data parsing using json and xml parsing, XmlPullParser. Integrating with 3rd party Apps using Web Services - Facebook, LinkedIn.

**Module 5: Commercializing your application**

Security, Performance - Kernel, Application level Security, Using permissions, designing for Performance & Designing for Performance, Syncing to cloud, Transferring data using Sync adapters, building apps for wearables, tv, Using Google Play to monetize - Selling in-app products

**Books for References:**

1. Professional Android 4 Development by Reto Meier, John Wiley and Sons, 2012
2. Android in Action, Third Edition, by W. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, 2012
3. Android Application Development Cookbook, by Wei-Meng Lee, John Wiley and Sons, 2013
4. Beginning Android 4, by Grant Allen, Apress, 2011
5. Beginning Tablet Programming, by Robbie Matthews, Apress, 2011

**Course Name: Web Technology and Value Added Services in Mobile**

**Course Description:** Value added services (VAS) are used in the telecommunication field. They are non-core services. Non-core services are services which facilitate more, than making calls. They may be available at a small or no cost. They add value to the standard services that are provided by the industry. Some of the value added services for mobiles are SMS, MMS, data access, etc.

This unit focuses on the characteristics and market of value added services and implementation techniques of SMS, MMS, data access and voice.

**Module 1: Introduction to Mobile VAS**

Introduction to Mobile VAS – Definition, Characteristics, Mobile VAS in India, SMS, MMS, Mobile TV, OTT Services, Missed call alerts, Voice mailbox, Mobile money, M-commerce, Mobile advertisements

**Module 2: Types of Value added services**

Consumer VAS, Network VAS, Enterprise VAS

**Module 3: Content-based Service**

CMS – Definition, Users, CMS Architecture, CMS Platforms, MCMS – Content Based Mobile Services, Mobile Content, Content Ingestion, DRM – Digital Asset Management, DRM, Subscriber Management, Storefront/UI, CMS Billing, Reporting, Marketing Tools, Ring back tone

**Module 4: Introduction to Interactive web**

Scripting Languages and WWW, Types of Scripting Languages – server-side scripting and client-side scripting, Introduction to JavaScript: Data types, variables, operators, expressions, statements, functions, objects, arrays, date, math, error handling, flow control, loops

**Module 5:JavaScript Object Model**

Regular expression, JavaScript object model, Standard Document Object Model - creating nodes, namespace, DOM and HTML, DOM and CSS, Event handling, Event types**,** Window object, dialogs, Controlling windows, form handling, form fields, form validation. UI elements, browser management, media management

**Books for Reference:**

1. Mobile Messaging Technologies and Services: SMS, EMS, and MMS by Gwenaël Le Bodic, John Wiley and Sons, 2005
2. Voice application development with Voice XML by Rick Beasley, John, O’Reilly
3. Next generation wireless applications: creating mobile applications in a Web by Paul Golding
4. Short Message Service (SMS): The Creation of Personal Global Text Messaging by Friedhelm Hillebrand, John Wiley & Sons, 2010
5. JavaScript: The Complete Reference, 2013 by [Thomas Powell](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Thomas+Powell&search-alias=stripbooks), [Fritz Schneider](http://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Fritz+Schneider&search-alias=stripbooks)

**Course Name: Computer Forensics Laboratory**

**List of Experiments:**

1.Physical Collection of electronic evidence using forensic standards

2. Dismantling and re-building PCs in order to access the storage media safely

3. Boot sequence and Power On Self Test mode analysis

4. Examination of File systems of Windows, Linux and Mac

5. Analysing Word processing and Graphic file format

6. Network data sniffing and analysing

7. Password and encryption techniques

8. Internet forensic and Malware analysis

9. Data recovery techniques for hard drive

10. Data recovery techniques for Pen drive and CD

**Course Name: Advanced Android – Laboratory**

**List of Experiments:**

1. Write a Program to Start a service
2. Write a Program to Stop a service
3. Demonstrate startService(), stopService() and onBindService()
4. Manipulate notifications
5. Android socket programming
6. Create web services
7. Working with processes and threads
   1. Create a thread which performs a single task
   2. Perform multithreading
8. Graphics apps in android
   1. Create an application where different shapes of different colors are displayed.
   2. Create an application where
   3. Create an application to show a cyclist moving from one direction to another
9. Animation apps like
   1. Bouncing ball
   2. Moving arrow, etc
10. Game creation in android like
    1. Shooting bubbles
    2. Shooting arrows
    3. Simple snake game, etc.

**SEMESTER 6**

**Course Name: Security in Wireless, VOIP and Mobile Apps**

**Objectives:** Basic understanding of server security in wireless is very important for any system administrator. As organizations move through the normal cycle of replacing their PBXes, VoIP can be viewed as a logical choice for converged messaging, call centres and interactive multimedia collaboration. Students can learn the basics of mobile communications, wireless security, VOIP security, mobile forensics and data extraction.

**Module 1: Introduction to Mobile communication**

Mobile & Telecommunication protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Mobile & Telecommunication vulnerabilities

**Module 2: Wireless Security**

Wireless protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Wireless vulnerabilities

**Module 3: Voice over Internet Protocol (VOIP) Security**

VOIP concepts, protocols and vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address VOIP vulnerabilities

**Module 4: Mobile Forensics & Data Extraction**

Mobile forensics process including seizure, data acquisition types like Physical, Logical, Manual, External & Internal memory, storage, analysis using tools & techniques

**Books for Reference**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole – Second Edition

**Course Name: Mobile Testing**

**Objectives:**Any technology, software or application can authorized for use by developers and Software engineers once it gets certified after testing. Testing is also a way of refining on developmental aspects of technology and is a valuable source for developing newer versions of the same. Mobile testing is not far from this truth. With the constantly increasing focus on mobile technology around the world and the number of mobile applications being developed for its users, mobile testing has predominantly gained momentum.

**Module 1: Testing Fundamentals**

SDLC, SDLC Phases, need of Testing, methods of Testing: Functional, Black Box, White Box, Regression, Stress, Monkey etc., TestCase, Rules to write TestCase, Testsuite and Test Runner

**Module 2: Introduction to Android testing framework**

Junit: Junit Test Framework, Features of Junit Test Framework, Testing Fundamentals-TestCase, TestSuite,TestRunners, JUnit classes, Junit in Android, Android Testing Framework, Test Projects-Directory Structure, Android Testing API, Mock Objects, Activity Testing, what to Test, ContentProvider Testing, service Testing, choosing devices to test, Testing tools

**Module 3: Mobile apps testing**

Need of testing, Mobile applications testing landscape, Common types of testing, UI and functional testing strategies of mobile applications, compatibilty testing need and methods, non-functional testing methods of mobile applications - Performance, security, types of operations testing for mobile applications - Installation, un-installation, upgrade, methods of testing the mobile application integration with phone features, challenges in testing, difference between testing mobile web and testing native app

**Module 4: Mobile testing tools**

Testing lifecycle of mobile applications, alternatives of testing environments for mobile apps testing, Differentiate between testing on physical devices, cloud devices and emulators, different test automation tools for mobile applications, key features of monkey talk tool, installation and use of monkeytalk tool for a mobile application on emulator, installation and use of monkeytalk tool for a mobile application on PC connected device, installation and use of monkeytalk tool for a mobile web, installation and use of monkeytalk tool for a mobile application for cloud device.

**Module5: UI and functional testing**

**Using monkey talk -** creation of test project, test suite and test script, record and playback feature, different verification techniques, data driven testing methods, synchronization, script parameterization, reporting features. **Using Robotium -** creation of test project, test suite, Robotium Framework, data driven testing methods

**Books for Reference:**

1. Android Application Testing Guide, Diego Torres Milano, 2010
2. Robotium Automated Testing for Android, Hrushikesh Zadgaonkar, 2011
3. A Practical Guide to Testing Wireless Smartphone Applications by Julian Harty, Mahadev Satyanarayanan, 2011
4. Testing Applications on the Web: Test Planning for Mobile and Internet-Based Systems Hung Q. Nguyen, Bob Johnson, Michael Hackett, 2012

**Course Name: Project and Viva-Voce**

Details of the project will be provided later