Bachelor of Computer Applications [Cloud Technology and Information Security]

Program Objective:

This unique program provides dual career options for the students in the fast growing technology sectors of Cloud Technology and Information Security. In addition to all the mandatory subjects of a traditional computer science program, this specialized program offers in-depth practical know-how of the current trend Technology – Cloud and Information Security. These sectors have the potential to grow exponentially and they provide challenging job opportunities for young professionals with the right skill sets.

On the Cloud Technology front, the program will provide students with the fundamental knowledge of all aspects of Cloud Technology. The program focuses on Virtualization Technology, Cloud Technology, Datacenters, Networking and Operating Systems.

On the Information Security front, this program equips the students with the concepts and the technical skills needed to secure Information and also creates awareness to different vulnerabilities, corrective measures and protection. The focus of the program is on the models, tools and techniques for enforcement of Security Policies, with emphasis on Cryptography, Ethical Hacking, Computer Forensics and Virtualization and Cloud Security.

CURRICULUM & SYLLABI FOR BCA (BACHELOR OF COMPUTER APPLICATIONS IN CLOUD TECHNOLOGY AND INFORMATION SECURITY) (SIX SEMESTERS / FULL TIME)

Semester I

Sl No	Course Code	Course Title	L	T	P	C
1	ENC1182	English-I	3	0	0	3
2	MAC1187	Algebra, Calculus and Trigonometry	3	1	0	4
3	CAC1111	Communication skills	3	0	0	3
4	CAC1112	Computer Fundamentals & Organization	3	0	0	3
5	CAC1113	Programming in C	3	0	0	3
6	CAC1114	Introduction to Linux	3	0	0	3
7	CAC1115	Programming in C Lab	0	0	3	1
8	CAC1116	Linux Lab	0	0	3	1
						21

Semester II

Sl No	Course Code	Course Title	L	T	P	C
1	ENC1283	English-II	3	0	0	3
2	MAC1288	Probability and Statistics	3	1	0	4
3	CAC1211	Fundamental of Storage System	3	0	0	3
4	CAC1212	Operating System	3	0	0	3
5	CAC1213	OOPS with C++	3	0	0	3
6	CAC1214	Data Structures using C	0	0	0	3
7	CAC1215	OOPS with C++ Lab	0	0	3	1
8	CAC1216	Data Structures using C LAB	3	0	3	1
						21

Cumulative Credits-21+21=42

Semester III

Sl No	Course Code	Course Title	L	T	P	C
1	CAC2111	Reasoning and Thinking	3	0	0	3
2	CAC2112	Information Security Fundamentals	3	0	0	3
3	CAC2113	Software Engineering	3	0	0	3
4	CAC2114	RDBMS	3	0	0	3
5	CAC2115	Computer Networks	3	0	0	3
6	CAC2116	Programming in JAVA	0	0	3	3
	CAC2117	RDBMS Lab	0	0	3	1
8	CAC2118	Programming in JAVA Lab	3	0	0	1
						20

Semester IV

Sl No	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	CAC2211	Installation and Configuration of Server	3	0	0	3
2	CAC2212	Ethical Hacking Fundamentals	3	0	0	3
3	CAC2213	Cryptography Fundamentals	3	0	0	3
4	CAC2214	Introduction to Cloud Technology	3	0	0	3
5	CAC2215	Fundamentals of Datacenter	3	0	0	3
6	CAC2216	Introduction to Public Speaking	0	0	0	3
7	CAC2217	Ethical Hacking - Lab	0	0	3	1
8	CAC2218	Installation and config of server	3	0	3	1
						20

Semester V

Sl No	Course Code	Course Title	L	T	P	C
1	CAC3111	Computer Forensics and Investigation	4	0	0	4
2	CAC3112	Virtualization and Cloud Security	4	0	0	4
3	CAC3113	IT Governance, Risk, & Information Security Management	4	0	0	4
4	CAC3114	Linux Administration	4	1	0	5
5	CAC3115	Introduction to Cloud Computing Solution	4	1	0	5
6	CAC3116	Principles of Virtualization	3	0	0	3
7	CAC3117	Computer Forensics and Investigation - lab	0	0	3	1
8	CAC3118	Principles of Virtualization – Lab	0	0	3	1
						27

Semester VI

Sl No	Course Code	Course Title	L	T	P	C
1	CAC3211	Mobile, Wireless and VOIP Security	4	0	0	4
						4

Project work:

Subject Code	Title of the project	Hrs/week	Credits	IA— periodic review	UE Dissertation + Viva	Total
CAC3212	Project and Viva-Voce	24	16	150	60+90	300

Cumulative Credits-21+21+20+20+27+20=129

Total credits = 127

Total Marks = 4000

SEMESTER-I

Communication Skills

L	T	P	C
3	0	0	3

Objective: The objective of this course is to make students feel the significance of communicating well and how it can have a profound effects in both our professional and personal lives. Students will learn various aspects of managerial writing including report writing. Business writing like Quote creation, Business letters, Orders, Complains and etc. are also taught to students.

Module1: 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.

Module 2: 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.

Module 3: 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.

Module 4: 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.

Module 5: Technical writing and communication

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

Text book:

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",TatamcGraw-Hill Publishing Company Limited, New Delhi.2009.

Reference book:

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. SangeetaSharma ,Binod Mishra, 'Communication Skills for Engineers and Scientists, PHI Learning Private Limited., New Delhi, 2009.

Outcome: Students shall overcome their inhibitions and limitations in communication and become effective communicators. They will learn to compose letters in English error-free and communicate effectively with their peers, colleagues, managers and so on, via appropriate business communication forms

English-I

L	T	P	C
3	0	0	3

OBJECTIVES:

- To help the students acquire efficiency in Spoken English through role plays.
- To enable them to make Presentation effectively.
- To develop reading skills among students through extensive readers.
- To orient them in writing letters.
- To train them in appreciating and interpreting English literature.

MODULE I **7**

Oral and Written Communication – implications in real life and workplace situations Essential English Grammar- 1-6 units

MODULE II **8**

One–minute Presentations (JAM) on concrete and abstract topics that test their creative thinking (ii) Prepared presentations and extempore presentations

Short Story ; O Henry - "Robe of Peace" (Extensive Reading)

MODULE III **8**

Role-Play – establishing a point of view - convincing someone on social issues such as preservation of water, fuel, protection of environment, gender discrimination.

Poetry:William Shakespeare - "All the World's a Stage"

MODULE IV **8**

Letter Writing- Letter of Invitation & Permission

Developing story from hints- Short Story : John Galsworthy - "Quality" (Extensive Reading)

MODULE V **8**

Précis Writing- Writing instructions and recommendations

Reading Comprehension: Short Story**--**Rudyard Kipling – "The Miracle of PuranBhagat" (Extensive Reading)

MODULE VI **6**

Written correspondence - - e-mail writing

Prose : Education, Employment, Unemployment

TOTAL : 45

REFERENCES:

1. Anderson, Kenneth & et.al. “Study Speaking : A Course in Spoken English for Academic Purposes” (Second Edition). Cambridge University Press, UK. 2004.
2. Sharma, R.C. & Krishna Mohan, “Business Correspondence and Report Writing”. Tata MacGraw – Hill Publishing Company Limited, New Delhi. 2002
3. Hurlock, B. Elizabeth. “Personality Development”. Tata McGraw Hill, New York. 2004.
4. Krishnaswamy. N, Sriraman T. .**Current English for Colleges.** Hyderabad: Macmillan Indian Ltd, 2006.
5. Dahiya SPS. Ed. **Vision in Verse- An Anthology of Poems**. New Delhi: Oxford University Press, 2002
6. Murphy, Raymond. **Essential English Grammar**. New Delhi: Cambridge University Press, 2009.
7. Seshadri, K G Ed. **Stories for Colleges.** Chennai: Macmillan India Ltd, 2003.

OUTCOME:

Students would be able to

- Actively take part in role plays
- Make effective presentation s
- Read and comprehend various texts.
- Write letters without making mistakes.
- Analyse literary texts.

	L	T	P	C
MAC 1187 ALGEBRA, CALCULUS AND TRIGONOMETRY	**3**	**1**	**0**	**4**

Objective:

The course is aimed at

- Developing the skills of students in applying basic concepts in chosen topics of mathematics that are imperative for effective understanding of application oriented topics.
- Laying the foundation for learning concepts of Differentiation, Integration and Trigonometry.

MODULE I Matrices (9+3)

Symmetric – Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a Matrix - Consistency - Characteristic equation - Eigenvalues and Eigenvectors - properties - Cayley Hamilton's Theorem (proof not needed) - Simple applications.

MODULE II Theory of equations (9+3)

Partial Fractions - Theory of equations- Polynomial Equations with real Coefficients - Irrational roots - Complex roots - Symmetric functions of roots - Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations.

MODULE III Differential Calculus (9+3)

Rules of differentiation - Derivative of implicit function - Successive differentiation- n^{th} derivatives - Leibnitz theorem (without proof) and applications - maxima and minima of functions of two variables - Partial differentiation - Euler's Theorem.

MODULE IV Integral Calculus (9+3)

Integration of rational functions - algebraic expressions involving only one irrational quantity- rational functions of sinx and cosx - Trigonometric substitutions - Bernoulli's formula for integration by parts - reduction formulae - properties of definite integral - Evaluation of double and triple integrals.

MODULE V Trigonometry (9+3)

De Moivre's theorem and its application - Circular and Hyperbolic functions - Inverse circular and hyperbolic functions - Expansion of trigonometric functions in terms of power and multiples - Separation of real and imaginary parts of logarithmic - trigonometric and inverse trigonometric functions - Summation of series including C+iS method.

L : 45, T : 15, Total hours: 60

Text Books:

1. Narayanan, S. and Manicavachagom Pillay, T.K. (2015) Calculus Vol. I,II &III S.Viswanathan (Printers & publishers) Pvt. Ltd., Chennai.

2. Venkataraman, M.K., “Higher Mathematics for Engineering and Science”, Third Edition, The National Publishing Co., Madras, 1986.

3. Kandasamy P, K. Thilagavathi and K. Gunavathy- Allied Mathematics Paper-I, First semester, 1/e, S. Chand & Co., New Delhi, 2003

REFERENCE BOOKS:

1. Stewart J - Single Variable Calculus (4th edition) Brooks / Cole, Cenage Learning 2010.

2. Tom M. Apostol - Calculus, Vol. I (second edition) John Wiley and Sons, Inc., Jan 2007.

3. Burnside W.S. and A.W. Panton - The Theory of Equations, Dublin University Press, 1954.

4. MacDuffee, C.C. - Theory of Equations, John Wiley & Sons Inc., 1954.

5. Ushri Dutta, A.S.Muktibodh and S.D. Mohagaonkar: Algebra and Trigonometry, PHI India, 2006

OUTCOME:

On completion of the course the students will be able to

- solve eigen value and eigenvector problems
- classify and solve polynomial equations of different types.
- differentiate different types of functions.
- integrate rational and trigonometric functions and to evaluate definite integrals (double and triple).
- demonstrate the application of Demoivre’s theorem and find the sum of series of trigonometric functions.

Computer Fundamentals and Organization

L	T	P	C
3	0	0	3

Course Objective:

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

Reference Books:

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 Outcome:

Students will get in-depth knowledge about the general features of a computer, which will allow introduce them to various features of computer, on which they can base their learning and design. An insight to the different software and hardware components of a computer will take them a step ahead in terms of what they can accomplish from their learning.

Programming in C

L	T	P	C
3	0	0	3

Course Objective:

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, mallocvscalloc, 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

Reference Books:

1. Let us C by YashwantKanetka, 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 Outcome: Students will learn how to write simple programs using C Language and execute them

Introduction to Linux

L	T	P	C
3	0	0	3

Course Objective:

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

Reference Books:

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 Outcome:

To enable the students to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification.

Programming in C Lab

L	T	P	C
0	03		1

Course Objective: 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.

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 Outcome: Students will write programs in C Language for lab experiments in this course and execute them.

Linux Lab

L	T	P	C
0	03		1

Course Objective:

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.

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 Smith	E2	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.

Course Outcome:

To enable the students to have a hands on practical exposure to the Linux Red Hat Enterprise and make them prepared for the RHCE Certification.

SEMESTER II

English-II

L	T	P	C
0	03		1

Objectives:

- To prepare students for Interviews and Group Discussions
- To train them in writing official letters , resume' writing and reports.
- To train them in analysing different genre of literature.

Module-I **7**

Filling Money Order Challan and Bank Challan

Short Story :G.K.Chesterton – The Hammer of God (Extensive Reading)

Essential English Grammar– 7-12 units

Module-II **8**

Brainstorming – Think, pair and share activity

Poetry **:**Walt Whitman- I Celebrate Myself

Module-III **8**

Dialogue Writing- Discussion etiquette -Assigning different roles in a GD (Note-taker, Manager, Leader and Reporter)

Prose**:** Environment

Module-IV **8**

Interview skills- SWOT Analysis

Letter Writing- Letter to the Editor- Letter of Application and CV

Module-V **8**

Report Writing- feasibility report and survey report

Short Story : Katherine Mansfield—A Cup of Tea (Extensive Reading)

Module-VI **6**

Technical reports –Writing a technical report – format and content

Total- 45

References:

1. M. Ashraf Rizvi 'Effective Technical Communication". Tata McGraw – Hill Education, 2005. Gerson, Sharon & Steven M. Gerson, " Technical Writing : Process and Product"

2. Pearson Education, New Delhi, 2004. 6. Riordan & Pauley. 'Report Writing Today'. 9th Edition. Wadsworth Cengage Learning, USA. 2005.
3. Krishnaswamy. N, Sriraman T. **Current English for Colleges.** Hyderabad: Macmillan Indian Ltd, 2006.
4. Dahiya SPS. Ed. **Vision in Verse- An Anthology of Poems**. New Delhi: Oxford University Press, 2002.
5. Murphy, Raymond. **Essential English Grammar**. New Delhi: Cambridge University Press, 2009.
6. Seshadri, K G Ed. **Stories for Colleges.** Chennai: Macmillan India Ltd, 2003.

OUTCOME:

Students would be able to

- Take part in group discussions and interviews with confidence.
- Write official letters, their application letter with CV and reports.
- Analyse various genre of literature.

L	T	P	C
3	1	0	4

MAC 1288 PROBABILITY AND STATISTICS

Objective:

- To impart knowledge about the basic concepts of probability in solving application oriented problems
- To provide an understanding on the concepts of statistics

Recap Introduction to Probability (4)

Sample space - events - algebraic operations on events - definition of probability - conditional probability - addition and multiplication theorems of probability – Baye's theorem.

MODULE I Random variables and distribution functions (10+3)

Discrete and continuous random variables - distribution function and its properties - probability mass function and probability density function - discrete and continuous probability distributions - Binomial, Geometric, Poisson, Uniform, Exponential and Normal distributions.

MODULE II Moments and Moment generating functions (8+3)

Expectation of a random variable – probability generating function – properties - moment generating function.

MODULE III Two dimensional random variables (6+3)

Joint, marginal and conditional distribution functions - independence of random variables.

MODULE IV Descriptive statistics (8+3)

Types of data - primary and secondary data - classification and representation of data - formation of frequency distribution - various measures of central tendency, dispersion and their merits and demerits - concept of skewness and kurtosis.

MODULE V Correlation and curve fitting (9+3)

Correlation coefficient and regression - rank correlation - curve fitting by least square methods - fitting a straight line, parabola, power curve and exponential curves. (no derivation, numerical problems only)

L : 45, T : 15, Total hours: 60

Text Books:

1. Richard Arnold Johnson, Irwin Miller, John E. Freund , Miller & Freund's Probability and Statistics for Engineers, Prentice Hall, 2011.

2. Dr. P. Kandaswamy, Dr. K. Thilagavathy and Dr. K. Gunavathy, Probability and Queuing Theory, Revised edition, S. Chand Publishing, 2013.

3. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw Hill, 2nd edition.

References:

1. Goon, A.M., M. K. Gupta and B. Das Gupta Fundamentals of Statistics- Vol. I, World Press Ltd, Kolkata, 2002.
2. Gupta, S.C. and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 2002.
3. Hogg, R.V. and A. Craig, Introduction to Mathematical Statistics, McMillan Publishing co., Inc. 1978.
4. Mood A.M., F.A. Graybill and D.C. Boes, Introduction to Theory of Statistics McGraw Hill Book Co., 1974.
5. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Fourth Edition, Elsevier.

OUTCOME:

On completion of the course the students will be able to

- solve basic problems in probability and fundamentals of statistics.
- solve problems using standard probability distributions.
- find the marginal and conditional distributions of two dimensional random variables.
- calculate rank correlation and fitting curves for the given data.

use method of moments and moment generating functions.

Fundamentals of Storage Management

L	T	P	C
0	03		1

Course Objective:

Data is all around us, in different forms and amounts. As we are steeping into revolutionizing world of advanced computing like cloud computing, data storage has also undergone many transformations in terms of techniques and hardware used for the same. This makes it significant for a computer student to learn different aspects of data storage. In this course, students will learn fundamentals of data storage, covering topics like demands on data, how storage techniques have evolved over a period of time and vital information about storage topologies like DAS, NAS and SAN, along with their comparison features. The second unit deals with different hardware required for storage like adapters, connectors, cables and their individual features. Different storage protocols used like ATA, SATA, SPI and its sub-categories will be taught to students in the following units. Topics storage security and storage infrastructure are addressed in the final unit.

Module 1 : Introduction to Information storage and Management

Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture, Data Center Infrastructure - Core elements- Key Requirements for Data Center Elements -Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits ,Summary

Module 2: Storage System Environment

Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host - Operating System - Device Driver -Volume Manager - File System – Application , Application Requirements and Disk Performance, Summary

Module 3: Backup and Recovery

Backup Purpose -Disaster Recovery - Operational Backup –Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods , Backup Process, Backup and Restore Operations, Backup Topologies - Serverless Backup , Backup Technologies -Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library

Module 4 : Local Replication

Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database , Local Replication Technologies - Host-Based Local Replication - Storage Array-Based Replication , Res tore and Restart Considerations - Tracking Changes to Source and Target , Creating Multiple Replicas, Management Interface

Module5: Managing the storage Infrastructure

Monitoring *the* Storage Infrastructure -Parameters Monitored - Components Monitored - Monitoring Examples - Alerts, Storage Management Activities - Availability management - Capacity management - Performance management - Security Management - Reporting- Storage Management Examples, Storage Infrastructure Management Challenges

Text Book:

1. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill Publication, 2003

Reference Book:

2. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

Course Outcome:

A good knowledge of data storage techniques using various storage topologies and their comparisons, will provide with students choose the best suitable data storage method for their programs and applications.

Operating System

L	T	P	C
3	0	0	3

Course Objective:

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.

Reference Books:

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,6thEdition,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 Outcome: After learning the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS, students will continue to more significant functions of OS like Process management, storage and memory management etc. This will provide the necessary information for students to extract maximum benefits out of the OS while developing programs, working with applications and etc.

OOPS with C++

L	T	P	C
3	00		3

Course Objective:

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.

Reference Books:

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 YeshwanthKanetkar

Course Outcome: Students willlearn to program in C++

Data Structures using C

L	T	P	C
3	00		3

Course Objective:

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.

Reference Books:

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, AusensteinMaoshe& M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

Course Outcome: Students will benefit from the knowledge of Data Structures and different operating one can perform on these like searching, sorting, stacking and etc. This forms a very strong foundation for programming in different languages that the students will take up in subsequent semesters or in any other course

OOPS with C++ Lab

L	T	P	C
0	0	3	1

Course Objective: To provide practical experience to students and reinforce the theory concepts

List of Programs

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

9. Using different methods to write programs to implement function overloading with default arguments for the following problems :

a) To find whether a given number is prime.

b) To find the factorial of a number

10. 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.

11. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.

12. Write a program to overload the following operators (any 3)

a) Binary operator '+' to concatenate 2 strings
b) Relational operator '<' to find whether one data is less than the other
c) Unary operator '++' to find the next date of a given date.

13. 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.

14. 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.

15. Using operator overloading concept implement arithmetic manipulation on two complex numbers.

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Data Structures using C Lab

L	T	P	C
0	0	3	1

Course Objective: To provide practical experience to students and reinforce the theory concepts

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.

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Mathematics- II

L	T	P	C
3	0	0	3

University Syllabus

SEMESTER III

Information Security Fundamentals

L	T	P	C
3	0	0	3

Course Objective:

The course primarily covers the Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security. It explains the formation of Security policy at various levels inside the Organization and provides the definition Procedures, Standard and Guidelines. The units emphasizes the need of Performing Asset Classification and Declassification, Retention and Disposal of Information Asset also it identifies the various levels of Authorization for access Viz., Owner, Custodian and User. The course covers the different types of Access Controls and Physical security measures to safeguard the Assets and conclusively, it deals with the Digital Rights Management also covering the concepts of Common Authentication protocols and Real world Protocols.

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.

Reference Books:

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 Outcome:

To enable students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. And also to get familiarize with Asset management along with the objective to create awareness in Digital Rights management

Software Engineering

L	T	P	C
3	0	0	3

Course Objective:

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 Outcome:

Learners will develop knowledge about Software Development Life Cycle, which is very essential for any Software Developer to design and develop any application or software. This course also includes modules on Software testing which forms an essential part of SDLC

RDBMS

L	T	P	C
3	0	0	3

Course Objective:

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. RamezElmasri, 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 Outcome: Students will learn how to write queries, transactions and different modelling techniques in a relational database.

Computer Networks

L	T	P	C
3	0	0	3

Course Objective:

It is important for networking professionals to have a sound grounding in the basics of networking and with the networking technology being developed thick and fast, the professionals need to be updated of them at all times. 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. 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

Reference Books:

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 Outcome: Students will develop knowledge and skills required to take up vendor certifications in the networking domain.

Programming in JAVA

L	T	P	C
3	0	0	3

Course Objective:

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

Reference Books:

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 Outcome:

Students will learn how to write Programs using Java

RDBMS Lab

L T P C
0031

Course Objective: To provide practical experience to students and reinforce the theory concepts

1. Create User in Oracle Database and grant and revoke the privileges and use of commit savepointroleback command.
2. Create the following:
- Synonym sequences and Index
- Create alter and update views.
3. Create PL/SQL program using cursors, control structure, exception handling
4. Create following:
- Simple Triggers
- Package using procedures and functions.
5. Create the table for
- COMPANY database
- STUDENT database and Insert five records for each attribute.
6. Illustrate the use of SELECT statement
7. Conditional retrieval - WHERE clause
8. Query sorted - ORDER BY clause
9. Perform following:
- UNION, INTERSECTION and MINUS operations on tables.
- UPDATE, ALTER, DELETE, DROP operations on tables
10. Query multiple tables using JOIN operation.

11. Grouping the result of query - GROUP BY clause and HAVING clause

12. Query multiple tables using NATURAL and OUTER JOIN operation.

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Programming in JAVA Lab

L T P C
0031

Course Objective: To provide practical experience to students and reinforce the theory concepts

List of Programs

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

12. 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.

13. Write a program to get file name at runtime and display number f lines and words in that file.

14. Write a program to list files in the current working directory depending upon a given pattern.

15. Create a textfileld that allows only numeric value and in specified length.

16. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Reasoning and Thinking

L	T	P	C
3	0	0	3

Course Objective: 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 Outcome: Through various Verbal ability activities and concepts, student will participate in solving questions in aptitude and logical reasoning questions.

SEMESTER IV

Installation and Configuration of Server

L	T	P	C
4	0	0	4

Course Objective:

Windows Server 2012 R2 Foundation is an operating system that enables core IT resources, such as file and print sharing, remote access, and security. It provides a network foundation from which you can centrally manage settings on your computers that are based on the Windows® operating system, and upon which you can run the most popular business applications. It also provides a familiar Windows user experience that helps you manage users and safeguard business information. This unit explores the method to install, upgrade, and deploy the Windows Server. Also, the learners will have the functional knowledge of configuring core network services and the active directory of Windows Server. This unit provides the knowledge and skills necessary to plan and implement a Windows Server 2012 and Windows Server 2012 R2 environment. It incorporates both the planning of the server infrastructure and key aspects of the implementation, management and maintenance of Active Directory and Network Infrastructure. It covers the most important job tasks for Server Administrators who are responsible for the planning, operations, and day-to-day maintenance of Windows Server 2012 and Windows Server 2012 R2 servers in the enterprise

Module 1: Installing and Configuring Servers

Selecting a Windows Server 2012:- Edition, Supporting Server Role, Supporting Server Virtualization, Server Licensing. **Installing Windows Server 2012:** System Requirement, Performing a Clean Installation, Installing Third-Party Drivers, Working with Installation Partitions, Using Server Core, Server Core Defaults, Server Core Capabilities, Using the Minimal Server Interface, Upgrade paths, Preparing to Upgrade Installation, Installing Windows Server Migration Tools. **Configuring Servers:** Completing Post-Installation Tasks and GUI Tools, Converting Between GUI and Server, Configuring NIC Teaming, Using Roles, Features, and Services, Using Roles Manager, Adding Roles and Features, Deploying Roles to VHDs, Configuring Services

Module 2: Configuring Local Storage

Planning Server Storage,Determining the Number of Servers Needed, Estimating Storage Requirements, Selecting a Storage Technology, Selecting a Physical Disk Technology, Using External Drive Arrays, Planning for Storage Fault Tolerance, Using Disk Mirroring, Using RAID, Using Storages Spaces, Understanding Windows Disk setting, selecting a Partition style, understanding disk and Volume Types, Choosing a Volume Size, Understanding File System, Working with Disks, Adding a New Physical Disk, Creating and Mounting VHDs, Storage Pool, Virtual Disks, Simple Volume, Creating a Striped, Spanned, Mirrored, or RAID-5 Volume, Extending and Shrinking Volumes and Disks

Module 3: Configuring File and Share Access

Designing a File-Sharing Strategy, Arranging Shares, Controlling Access, Mapping Drives, Creating Folder Shares, Assigning Permissions, Understanding the windows Permission Architecture and Basic, Advanced Permissions, Allowing and Denying Permissions, Inheriting Permissions, Understanding Effective Access, Setting Share Permissions, Understanding NTFS Authorization, Assigning Basic NTFS Permissions, Understanding Resource Ownership, Combining Share and NTFS Permissions

Module 4: Configuring Print, Document Services, Servers for Remote Management.

Understanding the Windows Print Architecture and Printing, Server Printing Flexibility, sharing a Printer Drivers and Managing Printer Drivers, Using Remote Access Easy Print, Configuring Printer Security, Adding Printer Servers, Deploying Printers with Group Policy, Adding Server and Workgroup Servers, Calibrating Server Manager Performance, Configuring WinRM and Windows Firewall, Creating Server Groups, Using Remote Server Administration Tools, Using Windows PowerShell Web Access, Installing Windows PowerShell Web Access, Configuring the Windows PowerShell Web Access Gateway,

Configuring a Test Installation, Customizing a Gateway Installation, Creating Authorization Rules, Working with Remote Servers

Module 5: Creating and Configuring Virtual Machine Settings and Storage

Virtualization Architectures, Hyper-V Implementations and Licensing, Hyper-V Hardware Limitations and Server, Installing Hyper-V, Using Hyper-V Manager, Creating a VM, Installing an Operating System, Configuring Guest Integration Services, Allocating Memory, Using Dynamic Memory, working with Virtual Disks, Understanding Virtual Disk Formats, Creating Virtual Disks, Creating a New Virtual Disk, Adding Virtual Disks to Virtual Machines, Creating Differencing Disks, Configuring Pass-Through Disks, Modifying Virtual Disks, Creating Snapshots, Connecting to a SAN, Connecting Virtual Machines to a SAN

Reference Books:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by Don Poulton (Author), David Camardella (Author)

Text Books:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. Administering Windows Server 2012 (Certification Guide) by Orin Thomas

Course Outcome: Students will acquire knowledge and skills needed to install and configure windows server 2012 and configure local storage and other services like file sharing and print sharing. Students will also be prepared to take up the certification exams in windows server 2012.

Ethical Hacking Fundamentals

L	T	P	C
3	0	0	3

Course Objective:

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.

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 Outcome: Students will learn the ethical hacking concepts which will provide them with in –depth understanding of the web application vulnerabilities and exploitation techniques. They will also familiarize themselves with the wide range of attacks in a networking environment and prepare a well-defined vulnerability report along with remediation techniques.

Cryptography Fundamentals

L	T	P	C
3	0	0	3

Course Objective:

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

Reference Books:

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 Outcome: Students will learn the basics of Cryptography, certain Cryptographic algorithms and its applications

Introduction to Cloud Technology

L	T	P	C
3	0	0	3

Course Objective:

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.

Text Books:

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

Reference Books:

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

Course Outcome: Students will learn the underlying principles of Cloud Technology and various types of cloud computing architecture and types. They will learn to evaluate between different cloud solutions offered by various providers based on their merits and demerits.

Fundamentals of Datacenter

L	T	P	C
3	0	0	3

Course Objective:

This course covers the significance, setting-up and Services provided by data centers. Datacenter fundamentals helps students to understand the basic concepts of Datacenter architecture, network infrastructure in a Datacenter, server frames fault tolerance, Datacenter availability, network implementation and disaster recovery.

Module 1: Overview of Data Centers

Datacenters Defined, Datacenter Goals, Datacenter Facilities, Roles Datacenters in the Enterprise, Roles of Datacenters in the Service Provider Environment, Application Architecture Models. The Client/Server Model and Its Evolution, The n-Tier Model, Multitier Architecture Application Environment, DataCenter Architecture

Module 2: Data Center Requirements

DataCenter Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe from Natural Hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard

Module 3: DataCenter Design

Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes,

Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism

Module 4: Introduction to Server Farms

Typesof server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet datacenter, corporate datacenter, software defined datacenter, datacenter topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, DataCenter Transport Layer, DataCenter Services, IP Infrastructure Services, Application Services, Security Services, Storage Services

Module 5: Business Continuity and Disaster Recovery fundamentals

Business continuance infrastructure services, the need for redundancy, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies

Reference Books:

1. IP Storage Networking by : Gary Oreinstein, Addison Wesley Professional, 2006
2. Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley; 1 edition (April 6, 2009)
3. Administering Data-Centers, KailashJayswal, Wiley; 1 edition (November 28, 2005)

Course Outcome: Students will learn the history of datacenters, how they have evolved over the years, different facilities and their requirements. They will also learn different aspects that have to be considered while designing a datacentre and various server farms and etc.

Ethical Hacking Lab

L	T	P	C
0	0	3	1

Course Objective: To provide practical experience to students and reinforce the theory concepts

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

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Installation and Configuration of Server Lab

L	T	P	C
0	0	3	1

Course Objective: To provide practical experience to students and reinforce the theory concepts

List of experiments:

1. Installation of Windows Server 2012
2. Configuration of Windows Server
3. Configuration of Local Storage for Windows Server
4. Configuration of File and Share Access for Windows Server
5. Configuration of Print and Document Services for Windows Server
6. Configuration of Windows Server for Remote Management
7. Creating Virtual Machine in Windows Server
8. Configuring and Setting Virtual Machine

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Introduction to Public Speaking

L	T	P	C
3	0	0	3

Course Objectives:
This course will introduce students to various important aspects of nonverbal communication and train them in the art of speech and develop negotiation capabilities. Also, it support students in their effort to perform satisfactorily in job interviews by talking to them, encouraging them and building their self-confidence

Module 1: Oral Communication

Principles of nonverbal communication - through clothes and body language, Types of managerial speeches - speech of introduction, speech of thanks, occasional speech, theme speech, Mastering the art of giving interviews in selection or placement interviews, discipline interviews, appraisal interviews, exit interviews, Building Persuasion & Negotiation abilities.

Module 2: Body Language & Grooming

Introduction to Body Language, Postures, Gestures, Eye contact, Personality styles, Grooming, Dress code

Module 3: Art of Communicating in Groups

Reading Comprehension, Group communication by way of meetings &group discussions, Business presentation - Features of good presentations - Planning, Structuring and Delivering presentations - Handling questions - Coping with nervousness.

Reference Books:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.

2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.
3. Shirley Taylor, Communication for Business, Pearson Education.
4. Lesiicar and Flatley, BasicBusiness Communication, Tata McGraw-Hill.
5. Courtan L. Bovee et al., Business Communication Today, Pearson Education.

Course Outcomes:

On successful completion of this course, students will be able to Prepare managerial speeches of the appropriate nature and also to speak freely without a script, Keep a watch on their bogy-language and Grooming aspects while communication with others, Perform exceedingly well while in a group, actively participating in group discussion and forums and Fare well in job interviews by preparing and presenting themselves with greater confidence

SEMESTER V

Computer Forensics and Investigation

L T P C
4004

Course Objective:

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 analysing 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)

Reference Books:

1. Guide to Computer Forensics and Investigations by Nelson

Course Outcomes:

This course will open the doors to students for latest trends and technologies used in the field of cyber forensics as applied to crime investigation and so on.

Virtualization and Cloud Security

L	T	P	C
4	0	0	4

Course Objective:

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 Outcome:

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.

IT Governance, Risk and Information Security Management

L T P C
4004

Course Objective:

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 Outcome: Students will understand the role of IT Governance and best practices that are used. They will learn how to develop a risk management program within the framework of ISACA

Linux Administration

L T P C
4105

Course Objective:

RHEL is a high performing operating system that. RHEL 6 is the sixth generation of the long term and predictable operating platform. With the flexibility to deploy on physical hardware, as a virtual host, as a virtual guest or in the cloud, Red hat Enterprise Linux 6 is the ideal foundation for next-generation datacenters. The fresh system administrators need to have a strong functional knowledge of RHEL 6 in any current IT work environment. The unit explores the security and network access controls in Linux, organizing network system and Mail Services, Securing Data and Account Management.

Module 1: Fundamentals of Linux:

Development of Linux, Linux Distributions. Structure of Linux Operating System, Logging In and General Orientation, The X Window System, KDE, GNOME. Navigating the File Systems, Managing Files, File Permission and Access, Shell Basics, Shell Advanced Features, File Name Generation. Common Unix commands

Module 2: Administration of Linux OS

Installing Linux, Configuring Disk Devices, Creating and Managing File Systems, File System Backup, Kickstart Installation, Linux Boot Loaders, Linux Kernel Management, Managing User Accounts, Understanding File Listing, Ownership and Permission, Managing Software using RPM, Connecting to Network, Linux Network Services, Setting up a Printer

Module 3:Input and Output Redirection

Input Redirection, Output Redirection, Error Redirection, Filter, Pipes. Networking in Linux: Network Connectivity, IP address, Accessing Remote system, Transferring files, and Internet configuration. Process Control: Identifying Process, Managing Process, Background Processing, Putting jobs in Background. Offline File Storage: Storing files to Media Booting process and User

Module 4: Linux Basic networking and naming service:

Introduction to Networking, Networking, Internet Network Services, Dynamic DNS, Electronic Messaging, Apache , NIS and Network File Sharing: NIS, Network File Sharing, SAMBA. Security: Defining System Security Policies, System Authentication Services and Security, Securing Services, Securing Data and Communication

Module 5: 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.

Reference Books:

1. The Complete Reference, Linux Sixth Edition by Richard Petersen.
2. Red Hat ®Enterprise Linux® 6 Administration by Sander van Vugt
3. Linux System Administration by Paul Cobbaut.

Course Outcome:

Students will attain skills required to manage and administer systems and servers using Linux Operating System. The operating system used for this unit is Red hat Enterprise Linux 6 (RHEL 6). Students may also appear for RED HAT Certification exam in Linux Administration after the completion of this course.

Introduction to Cloud Computing Solution

L T P C
4105

Course Objective:

Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and services through a global network of Microsoft-managed data centers.

Module 1: Introduction

Introduction to MS. Azure, **Virtual Machines:** Creating Virtual Machines, Difference Between Basic and Standard VMs,Logging in to a VM and Working, Attaching an empty Hard Disk to VM, Hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM,Creating a VM from a custom Image, Shut down VM without Getting Billed,VM Pricing

Module 2: Managing Infrastructure in Azure

Managing Infrastructure in Azure: Azure Virtual Networks, Highly Available Azure Virtual Machines ,Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. **Load Balancing:** Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer.

Module 3: Windows Azure

Azure Storage: What is a Storage Account,Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control **Automation:** Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script

Module 4: SQL Azure

SQL Azure: Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Tables, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.

Module 5: Websites

Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between Free, Shared, Basic and Standard websites, Creating a website using Visual studio

Text Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

Reference Books:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. Windows Azure Step By step by Roberto Brunetti.

Course Outcome: Students will learn the basics of cloud technology in Windows Azure services like computer service, network service, data service and App service. Programming with windows azure is also covered in depth.

Principles of Virtualization

L T P C
3003

Course Objective:

Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility in organizations. This unit explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server hyper V.

Module 1: Basics of Virtualization

Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery

Module 2: Deploying and Managing an Enterprise Desktop Virtualization Environment

configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

Module 3: Deploying and Managing a Presentation Virtualization Environment

Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

Module 4: Accessing Published Applications

Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings

Module 5: Understanding Virtualization Software

List of virtualization Software available .Vmware- introduction to Vsphere, ESXi, VCenterServer andVsphere client. Creating Virtual Machine.. Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals

Reference Books:

1. Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
2. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008
3. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

Course Outcome:

Students will understand Virtualization, how to plan for a virtual implementation and also prepare for different vendor technologies available in the field of Virtualization.

Computer Forensics and Investigation -Lab

L	T	P	C
0	0	3	1

Course Objective: To provide practical experience to students and reinforce the theory concepts

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 Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

Principles of Virtualization -Lab

L	T	P	C
0	0	3	1

Course Objective: To provide practical experience to students and reinforce the theory concepts

List of Experiments:

1. Installing VmwareESXi server.
2. Installing VmwarevCenter with all the prerequisites.
3. Creating Virtual Machines using vCenter server.
4. Modifying Virtual Machine settings.
5. Clone a VM.

Course Outcome: Students will work on the tasks provided to them in the form of experiments and write programs to produce the desired result

SEMESTER VI

Mobile, Wireless and VOIP Security

L T P C
4004

Course Objective: This course discusses various threats and vulnerabilities existing in Mobile communication environment. It teaches students about securing information and data in environments like wireless, VoIP and Bluetooth

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

Reference Books:

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

2. Network Security Bible by Eric Cole – Second Edition

Course Outcomes:

On successful completion of this course, students will be able to Keep data secured in Wireless, VoIP and Bluetooth environment

Project and Viva-Voce

Details of the project will be provided later