

KONERU LAKSHMAIAH EDUCATION FOUNDATION
CENTRE FOR DISTANCE AND ONLINE EDUCATION(CDOE)
BCA PROGRAM STRUCTURE FOR OL/ODL

AY-2020-21

I Semester									II Semester								
Sl #	Course Code	Course Title	Cr	L	T	P	S	CH	Sl #	Course Code	Course Title	Cr	L	T	P	S	CH
1	20UC1101O	Integrated Professional English	2	2	0	0	0	2	1	20UC1202O	English Proficiency	2	2	0	0	0	2
2	20MT1101O	Fundamentals of Mathematics	4	4	0	0	0	4	2	20CA1201O	Object Oriented Programming Using Python	4	3	0	2	0	5
3	20CA1102O	Problem Solving through Programming	4	3	0	2	0	5	3	20CA1202O	Data Structures	4	3	0	2	0	5
4	20CA1103O	Operating Systems	4	3	1	0	0	4	4	20CA1203O	Computer Networks	4	3	1	0	0	4
5	20CA1104O	Digital Logic Design & Computer Organization	3	3	0	0	0	3	5	20UC0009O	Ecology & Environment	2	2	0	0	0	2
									6	20CA1204O	Database Management System	4	3	0	2	0	5
		Total	17	15	1	2	0	18			Total	20	16	1	6	0	23

III Semester									IV Semester								
Sl #	Course Code	Course Title	Cr	L	T	P/S	S	CH	Sl #	Course Code	Course Title	Cr	L	T	P/S	S	CH
1	20CA2101O	Web Application Development	4	3	0	2	0	5	1	20UC0010O	Universal Human Values & Professional Ethics	2	2	0	0	0	2
2	20CA2102O	Linux Administration	4	3	0	2	0	5	2	20CA2201O	Installation and Configuration of Server	4	3	0	2	0	5
3	20CA2103O	Information Storage and Management	3	3	0	0	0	3	3	20CA2202O	Digital Forensics	4	4	0	0	0	4
4	20CA2104O	Principles of Virtualization	4	3	0	2	0	5	4	20CA2203O	Cloud computing fundamentals	4	4	0	0	0	4
5	20CA2105O	Network & Information Security	4	3	1	0	0	4	5	20CA2204O	Software Engineering	4	3	0	2	0	5
6	20UC2103O	Professional Communication Skills	2	2	0	0	0	2	6	20CA2205O	Cloud Web Services	4	3	0	2	0	5
		Total	21	17	1	6	0	24			Total	22	19	0	6	0	25

V Semester								
			Cr	L	T	P/S	S	CH
1	20CA3101O	Cloud Information Security	4	3	1	0	0	4
2	20CA3102O	Cloud Deployment	4	3	0	2	0	5
3	20CA3103O	Design and Developemt of Cloud Applications	4	3	0	2	0	5
4	20CA3104O	Malware Analysis	4	3	0	2	0	5
5	20CA3105O	Ethical Hacking	4	3	0	2	0	5
		Total	20	15	1	8	0	24

VI SEMESTER								
Sl #	Course Code	Course Title	Cr	L	T	P/S	S	CH
1	20CA3201O	Configuration Management on Cloud	4	4	0	0	0	4
2	20CA3202O	Secure Software Design	4	4	0	0	0	4
3	20CA3203O	Major Project	15	0	0	30	0	15
		Total	23	8	0	30	0	23

Total Program Credits

123

BACHELOR OF COMPUTER APPLICATIONS

I Semester

SN	Course Code	Course title	Credits	L-T-P-S	CH
01	21UC1101 O	Integrated Professional English	2	2-0-0-0	2

COURSE OUTCOMES:

CO NO	Course Outcome (CO)	PO/PSO	BTL
CO1	Understand the concepts of grammar to improve communication, reading, and writing skills.	PO10	2
CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions.	PO9	2
CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices.	PO9	2
CO4	Apply the concepts of writing to draft corporate letters, emails, and memos.	PO10	3

SYLLABUS:

CO 1: a) **Basic Grammar** - Countable and uncountable nouns, present simple and continuous, past simple and continuous - classroom practice - Understand and interpret Texts and workplace situations
b) **Structural Pattern** - Present continuous for future arrangements State verbs, Regular and irregular verbs, Voice, Modal verbs - Reporting on going tasks in the corporate world
c) **Descriptive and Qualitative Patterns:** Adjectives and Adverbs classroom practice) Time Expressions, Comparatives and superlatives, Pronouns, Conditionals, Phrases and clauses (Including Relative)

CO 2: a) **Formal contexts:** Being a PA, describing changes in a company Taking orders over the phone. b) **Listening & Speaking:** Participate in conversation with proper contextual language markers, turn taking. Classroom practice- Presenting context, reason, problem - Case analysis (short).

i. Body Language: Dos and Don'ts of one-to-one interaction, Telephone interaction Video/ web conferencing. Culture specific practices.

ii. Work Etiquette- situation, ambience, team skills, time management and leadership ability.

CO 3: a) Understand and assimilate main ideas and specific details. (250-300 words text of moderate difficulty)b)Read for general understanding, interpreting, factual or specific information, for grammatical accuracy and information transfer c)Understand the general meaning of corporate context and office correspondence. d)Understand short reports of predictable nature.

CO 4: a) Internal Correspondence. Making notes on routine matters, such as, taking/ placing orders. b)Emails: Types of emails, salutations, vocabulary used in formal and informal (Including beginnings and endings)c)Writing straight-forward, routine letters of factual nature

REFERENCE BOOKS:

1. Business Benchmark Book- Preliminary- 2nd edition Cambridge Press 2019.
2. Business Benchmark Book- Pre-Intermediate to Intermediate- 2nd edition Cambridge Press 2019

WEB LINKS:

1. <https://www.cambridgeenglish.org/>
2. <https://learnenglish.britishcouncil.org,https://apps.apple.com/in/app/bec-from-cambridge/id1351207688https://play.google.com/store/apps/details?id=com.liqvid.bec>

SN	Course Code	Course title	Credits	L-T-P-S	CH
02	20MT11010	Fundamentals Of Mathematics	4	4-0-0-0	4

COURSE OUTCOME

CO	Course Outcome (CO)	PO/PSO	BTL
CO1	Fundamental concept. Solve problems of matrices	PO2	2
CO2	Formulate differential calculus, differentiation rules and identify a method for solving and interpreting the results.	PO2	2
CO3	Formulate physical laws and relations mathematically in the form of second/higher order differential equations and identify a method for solving and interpreting the results.	PO2	3
CO4	Formulate partial differential equations and identify method for solving PDE's	PO2	3

SYLLABUS

CO 1: Matrices: A quick review of the fundamental concepts, Rank of a Matrix, Non-Singular and Singular matrices, Elementary Transformations, Inverse of a Non-Singular Matrix, Canonical form, Normal form. Systems of Linear equations: Homogeneous and Non Homogeneous Equations, Characteristic equation of a matrix. (Relevant sections of Text 1). (proof of all the theorems are to be excluded.)

CO 2: Differential Calculus : A quick review of limits of function, rules for finding limits, extensions of limit concepts, derivative of a function, differentiation rules, chain rule, rate of change and simple applications of the rules. Extreme values of a function Rolle's Theorem, Mean Value Theorem .

CO 3: Ordinary Differential Calculus: Introduction, Formation of ODE by elimination of arbitrary constants & functions. Solving first order ODE by variable-separable method, linear equation & Bernoulli's equation for non-linear. Solving second and higher order ODE with constant coefficient. Complimentary functions and Particular Integrals like e^{ax} , $\sin ax$, x^n . Solving by the method of Variation of Parameters.

CO 4: Partial Differential Equations: Introduction, formulation of Partial Differential Equation by elimination of arbitrary constants and by elimination of arbitrary function. Solution of the first order equations using Lagrange's method.

TEXT BOOKS:

1. Dr. B. S. Grewal - Higher Engineering Mathematics
2. S.K . Stein - Calculus and analytic Geometry , (McGraw Hill)
3. Shanti Narayan - Matrices (S. Chand & Company)

REFERENCE BOOKS:

1. Zubair Khan, Shadab Ahmad Khan - Mathematics - 1 and Mathematics - II (Ane Books)
2. N.P.Bali, Dr.N.Ch.Narayana Iyengar-Engineering mathematics - L
3. Matrices, Frank Ayres JR Schaum's Outline Series, TMH Edition
4. Thomas and Finney - Calculus and analytical geometry (Addison-Wesley)

SN	Course Code	Course title	Credits	L-T-P-S	CH
03	20CA11020	Problem Solving Through Programming	4	3-0-2-0	5

COURSE OUTCOMES

CO	Course Outcome	PO/PSO	BT L
CO 1	Explain different concepts of C programming, used to create programs.	PO1,PSO1	2
CO 2	Discuss about different data types and control structures	PO1,PSO1	2
CO 3	Demonstrate the working of functions, arrays and pointers	PO2,PSO1	3
CO 4	Identify the working of different file handling methods	PO1,PSO1	3
CO 5	Develop programs using basic and advanced concepts of C language	PO2,PSO1	3

SYLLABUS

C01:Overview of Programming: Introduction, Program design and implementation, Flowcharts & Algorithms, Programming environment - Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters .

Fundamentals of C programming: Overview of C, Data Types, Constants & Variables, Operators & Expressions, Control constructs -if

CO 2:Basic I/O-formatted and Unformatted I/O, Type modifiers and storage class specifiers, Type casting, type conversion.

Advanced programming techniques: Control constructs- for, while, Do while, Switch statement, break and continue, exit() function, go to and label , Functions, Scope rules, call by value and reference, calling functions with arrays, argc and argv, recursion- basic concepts, Arrays- single & multidimensional arrays.

CO3:Pointers- Pointer expression, Pointer operations, malloc vs calloc, arrays of pointers, pointers to pointers, pointers to functions, function retuning pointers, **Structures-** Basics, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures,Unions,enumerated data-types, typedef.

CO4: Additional features: File Handling - The file pointer, file accessing functions, C Pre-processor commands, Conditional compilation directives, C standard library and header files: Header files, string functions.

TEXT BOOK:

1. The C programming Language by Richie and Kenninghan, 2004, BPB Publication

REFERENCE BOOKS:

1.Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill .

2.Let us C by Yashwant Kanetkar, 6th Edition, PBP Publication

SN	Course Code	Course title	Credits	L-T-P-S	CH
04	20CA11030	OPERATING SYSTEMS	4	3-1-0-0	4

COURSE OUTCOMES

CO	Course Outcome	Mapped PO	BTL
CO 1	Discuss the working of an operating system, with its features, uses, and other functionalities.	PO1, PSO1	2
CO 2	Describe process and storage management and how OS performs various functionalities	PO2, PSO1	2
CO 3	Identify the purpose of different process synchronization and management methods	PO3, PSO1	3
CO 4	Organize security and file system management in an operating system.	PO2, PSO1	3

SYLLABUS

CO1: Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines. **Processes:** Process concept, Process scheduling, Inter process communication. **Threads:** Introduction, User and Kernel threads, Multithreading models.

CO2: CPU Scheduling: Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Classic problems of synchronization, Semaphores, Monitors; **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

CO3: Memory Management: Logical and physical Address Space, Swapping, Paging, Page Replacement, Segmentation with Paging ; **File-System:** File-System structure, Access Methods, Directory structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery

CO4: Protection: Goals of Protection, Domain of Protection, Access Matrix, and Implementation of Access Matrix, Revocation of Access Rights.

TEXT BOOKS:

1. Silberschatz / Galvin / Gagne, Operating System, 6th Edition, WSE (WILEY Publication)

REFERENCE BOOKS:

1. William Stallings, Operating System, 4th Edition, Pearson Education.
2. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
3. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
4. H.M.Deitel, Operating systems, 2nd Edition, Pearson Education
5. Nutt: Operating Systems, 3/e Pearson Education 2004

SNo	Course Code	Course title	Credits	L-T-P-S	CH
05	20CA11040	DIGITAL LOGIC DESIGN & COMPUTER ORGANIZATION	3	3-0-0-0	3

COURSE OUTCOMES

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Understand basic components of a computer system	PO1, PSO1	2
CO 2	Apply logic simplification procedures	PO3, PSO1	3
CO 3	Apply Combinational Logic	PO4, PSO1	3
CO 4	Apply arithmetic and logic functions	PO4,8, PSO1	3

SYLLABUS

CO1: Basic Computer Organization

Peripheral devices, Input - Output interface, CPU, Memory, Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions, Introduction of Multiprocessors: Characteristics of multi-processors.

CO2: Logic Simplification and Combinational Logic Design: Number Systems, Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Karnaugh maps, Binary codes, Code Conversion, Integrated Circuit Logic Gates.

CO3: Combinational Logic Functions: Adder and Subtractor, Decoders, Encoders, Multiplexers, Demultiplexers, Magnitude Comparators, Parity Generators and Checkers, BCD to seven segment decoders. Verilog HDL design for Combinational Logic Functions.

CO4: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms.

Register Transfer and Micro-operation

Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder-Subtractor, Binary Incrementor, Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit.

TEXT BOOKS:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings, PHI
3. Stephen Brown and Zvonko Vrane "Fundamentals of Digital Logic with Verilog Design" Second Edition, McGraw-Hill.
4. M. Morris Mano, "Digital Logic and Computer Design", Pearson

REFERENCE BOOKS:

5. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009
6. J. Bhasker, "Verilog HDL Synthesis, A Practical Primer", Star Galaxy Publishing.
7. Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH
8. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons
9. Fundamental Of computer Organization by Albert Zomaya, 2010

II Semester

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
01	20UC12020	English Proficiency	2	2-0-0-0	2

Course Outcomes:

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Demonstrating different interpersonal skills for employability	PO8	2
CO2	Distinguishing business essential skills	PO9	2
CO3	Classifying social media and corporate communication skills	PO12	2
CO4	Applying analytical thinking skills	PO12	3

SYLLABUS

COMPETENCY: 1 Job description- Advice on job applications - getting the right job- importance of doing a job interview -Launching and promoting a new product-Persuasive and negotiation skills - Types of emails: giving information, making an enquiry, answering enquiries -Marketing Report

COMPETENCY 2: Becoming an entrepreneur- buying a franchise- franchising start -up -presenting business idea- signaling parts of presentation - arranging business travel- business conferences and meetings- spending sales budget

COMPETENCY 3: Social media and business- introducing company using social media- staff survey- survey report- off-shoring and outsourcing- customer satisfaction and loyalty- communication with customers- corresponding with customers- business across cultures

COMPETENCY 4: Underlying assumptions, finding the conclusions, Argument strengthening, Argument weakening, finding the fallacies

REFERENCE BOOKS:

1. Business Benchmark Book- Upper Intermediate - 2nd edition Cambridge Press 2019.
2. Business Benchmark Book- Pre-Intermediate to Intermediate- 2nd edition Cambridge Press 2019.
3. Business Benchmark Book-Upper Intermediate: 2nd Edition Cambridge Press, 2019
4. Pillai, Sabina, et.al, Soft Skills and Employability Skills, New Delhi: CUP. 2018. Print.
5. Peterson, Reading Skill, New York: Peterson. 2007
6. Verbal and Non-Verbal Reasoning, R. S. Aggarwal, S Chand Publications.
7. R S Aggarwal, S Chand, 'A modern approach to Logical reasoning'
8. GRE Barron's, Mc Graw Hills
9. Logical Reasoning, Edgar Thorpe, Pearson Publications

WEB LINKS:

1. <https://www.cambridgeenglish.org/>
2. <https://learnenglish.britishcouncil.org>,
3. <https://apps.apple.com/in/app/bec-from-cambridge/id1351207688>
4. <https://play.google.com/store/apps/details?id=com.liquid.bec>
5. <https://www.cambridgeenglish.org/exams-and-tests/business-preliminary/exam-format/>

6. <https://www.cambridgeenglish.org/exams-and-tests/business-preliminary/preparation/>

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
02.	20CA12010	Object Oriented Programming using Python	4	3-0-2-0	5

COURSE OUTCOMES:

Course objectives:

3. Describe the core syntax and semantics of Python programming language.
4. Discover the need for working with the strings and functions.
5. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
6. Indicate the use of regular expressions and built-in functions to navigate the file system.
7. Infer the Object-oriented Programming concepts in Python.

CO-1

Basics of Python Programming Language, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, Control Flow Statements-If , The while Loop, The for Loop, The continue and break Statements,

Functions, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

CO-2

Strings, Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings,

Lists, Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.

Dictionaries, Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement,

Tuples and Sets, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.

CO-3

Files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression Operations**, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.

CO-4

Object-Oriented Programming, Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.

Reference Books:

1. Gowrishankar S, Veena A, “**Introduction to Python Programming**”, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-081539437
2. Jake VanderPlas, “**Python Data Science Handbook: Essential Tools for Working with Data**”, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Aurelien Geron, “**Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems**”, 2nd Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
4. Wesley J Chun, “**Core Python Applications Programming**”, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
5. Miguel Grinberg, “**Flask Web Development: Developing Web Applications with Python**”, 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
03	20CA12020	Data Structures	4	3-0-2-0	5

COURSE OUTCOMES:

CO.	Course Outcome	Mapped PO	BTL
CO 1	Discuss various data structures and explain how they can be used for searching and sorting elements	PO1, PSO1	2
CO 2	Identify the pros and cons of different searching and sorting algorithms	PO1, PSO1	2
CO 3	Experiment with working of different data structures and their applications	PO3, PSO1	3
CO 4	Summarize the working of linked lists, trees and graphs	PO1, PSO1	3
CO 5	Develop programs to demonstrate the functionality of different data structures, sorting algorithms, searching algorithms, etc.	PO2, PSO1	3

SYLLABUS

CO-1

Introduction to Data structures: Definition, Classification of data structures, Time and space complexity, Dynamic memory allocation and pointers, Memory allocation functions. **Searching:** Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods

CO-2

Sorting Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort.

Stack and Queue: Stack - Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, 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

CO-3

Linked List: Definition, Representation, Types of linked lists, creation, insertion, deletion, search and display.

Trees: Definition, Binary tree, Complete binary tree, Binary search tree, Heap Tree, Traversal of Binary Tree,

CO-4

Graphs: Application of Graphs, Depth First search, Breadth First search.

Text Book:

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001

Reference Books:

2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Data Structures by E. Balagurusamy, McGraw Hill Education
4. Tenenbaum, Data Structures. Pearson Education, 200
5. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
04.	20CA12030	Computer Networks	4	3-1-0-0	4

COURSE OUTCOMES:

CO.	Course Outcome	Mapped PO	BTL
CO 1	Discuss how to establish a connection among various devices. Explain the different networking concepts and devices that are used today for establishing connectivity.	PO3, PSO1	2
CO 2	Outline the functionalities of different network protocols	PO2, PSO1	2
CO 3	Describe different WAN technologies, topologies and other basic networking concepts.	PO2, PSO1	2
CO 4	Explain how to troubleshoot a network.	PO3, PSO1	2

SYLLABUS

CO-1

Networking Fundamentals Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Topologies, Transmission Media, Communication Modes, Wiring Standards and Cabling- **Introduction of OSI model**, OSI model, TCP/IP Model, TCP, UDP, IP, ICMP, ARP/RARP, Comparison between OSI model & TCP/IP model.

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.

CO-2

Data Link Layer: Ethernet, PPP, PPP standards, ARP, Message format, Wireless Technology, Wireless Access Points, Wireless NICs, wireless LAN standards: wireless LAN modulation techniques, wireless security Protocols: **Network Layer:** Internet Protocol (IP), IP standards, versions, functions, IPv4 addressing, Subnet Mask, Default Gateway, methods of assigning IP address, Ipv6 address, types, assignment.

Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP.

CO-3

WAN Technology 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,

CO-4

Network and Internet Troubleshooting, Troubleshooting Model, identify the affected area, probable cause, implement a solution,
Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat,
Hardware trouble shooting tools, system monitoring tools.

TEXT BOOK:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD), by Todd Lammle, Wiley India,

REFERENCE BOOKS:

- 1.CCNA/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
- 2.Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008.
- 3.CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
05.	20UC0009	Ecology & Environment	2	2-0-0-0	2

COURSE OUTCOMES:

CO No:	CO	PO	BTL
CO 1	Understand the importance of Environmental education and conservation of natural resources.	6	1
CO 2	Understand the importance of ecosystems and biodiversity.	12	1
CO 3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.	6	3

SYLLABUS:

The Multidisciplinary nature of Environmental Studies - Natural Resources- Forest resources - Mining its impact on environment - Water resources - Mineral resources-. Energy resources - Land resource s- Soil erosion - Ecosystems - Biodiversity and its ConservationEnvironmental Pollution - Soil waste management - Electronic waste management, biomedical waste management - Disaster management -.Environmental Legislation Environmental Impact Assessment Process.

TEXT BOOK:

- 1.Anubha Kaushik, C.P.Kaushik, "Environmental Studies" , New Age International, (2007).
- 2.Benny Joseph, "Environmental Studies", Tata McGraw-Hill companies, New Delhi, (2009).

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
06.	20CA12040	Database Management System	4	3-0-2-0	5

COURSE OUTCOMES:

CO.	Course Outcome	Mapped PO	BTL
CO 1	Discuss the importance of creating and maintaining an error free database.	PO1, PSO1	2
CO 2	Apply different SQL commands to manipulate a database	PO3, PSO1	3
CO 3	Apply normalize a database	PO1, PSO1	3
CO 4	Apply transaction concepts in a database	PO3, PSO1	3
CO 5	Develop database tables and manipulate them using SQL queries	PO2, PSO1	3

SYLLABUS:

CO-1

Purpose of Database System, Views of data, Database Languages, Database System Architecture - Database users and Administrator, E-R model, The relational Model, Domain Relational Calculus, Tuple Relational Calculus , Fundamental operations - Additional Operations, SQL fundamentals, Constraints, working with Tables.

CO-2

SQL : Integrity Constraints , Range Searching, Pattern Matching, Grouping, Manipulation of data. Joining tables ,Union, intersect & Minus Clause, Views, , Granting Permissions, Creating Indexes, Creating and managing User, Triggers - Security.

CO-3

Embedded SQL- Dynamic SQL- Functional Dependencies - First, Second, Third Normal Forms, Dependency Preservation - Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form ,Fifth Normal Form. Transactions : Transaction Concepts - Transaction Recovery - ACID Properties

CO-4

Concurrency - Need for Concurrency - Locking Protocols - Two Phase Locking - Intent Locking - Recovery Isolation Levels - SQL Facilities for Concurrency.

TEXT BOOKS:

1. An Introduction to Database Systems, by C.J. Date, Pearson

REFERENCE BOOKS:

1.RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addison Wesley

2.Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill

3.Database Systems: The Complete Book, by Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, Pearson

III Semester

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
01	20CA21010	Web Application Development	4	3-0-2-0	5

COURSE OUTCOMES:

CO.	Course Outcome	Mapped PO	BTL
CO 1	Understand basic programming skills in core Python.	PO2,PSO1	2
CO 2	Apply basic principles of Python programming language	PO1,PSO1	3
CO 3	Implement database and GUI applications.	PO1, PSO1	3
CO 4	Develop program Python applications	PO3, PSO1	3
CO 5	Develop the skill of designing Graphical user Interfaces in Python	PO3, PSO1	3

SYLLABUS

CO-1

Introduction to Python Environment: , Classes/Objects , Inheritance , Scope , Modules , Dates ,Math , JSON , Regular Expressions , PIP , Exception Handling , UserInput , String Formatting, Dictionaries.

CO-2

Libraries: SciPy, NumPy, Scikit-learn, matplotlib.

Data Management : Sampling data, File Handling, Accessing Data from Relational Databases,

Python MongoDB : Features, MongoDB Create Database , Create Database, Create Collection, Insert, Find, Sort ,Delete ,Drop Collection, Update, Limit.S

CO-3

Python Client Programming :Web Page Structure , Using urllib , Parsing HTML , Screen Scraper.

Web server programming : Web Crawler , SimpleHTTP And BaseHTTP Servers , CGI Programming Form Processing, Writing XML File , Parsing XML , Finding XML Elements

Web/Database Applications in Python :Database Web Programming, HTML Database Data , Input Database Data , Update Database Data.

CO-4

Django Web Application Framework: Installing and Setting Up Django ,Django API , Django Admin App , Django Views , Django Templates , Add Remove Data, Django Forms / Templating, Building some full stack applications

TEXT BOOKS:

1. Python: The Complete Reference by By Martin C. Brown

REFERENCE BOOKS:

1.Fluent Python: Clear, Concise, and Effective Programming

2.Python Cookbook, Third edition by David Beazley and Brian K. Jones.

3.How To Think Like A Computer Scientist: Learning With Python, by Allen Downey, Jeff Elkner and Chris Meyers

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
02	20CA2102	Linux Administration	4	3-0-2-0	5

COURSE OUTCOMES:

CO.	Course Outcome	Mapped PO	BTL
CO 1	Describe Linux System Structure	PO1,PSO1	2
CO 2	Understand Boot Process of Linux and Software Package Administration	PO1, PSO1	2
CO 3	Demonstrate User and Group Administration	PO1, PSO1	3
CO 4	Ability to configure NIS, NFS,DNS and DHCP	PO1, PSO1	3
CO 5	Ability to configure web, mail and log server.	PO1,2, PSO1	3

SYLLABUS:

C0-1

Introduction to Linux and UNIX : History of UNIX & LINUX , Basic Concepts of Operating Systems, Kernel, shell and file system structure

Installation of Linux : Different types of Installation Methods , GUI ,Text

Linux System Structure : Basic concepts of Linux , Differences between Red Hat Enterprise Linux & CentOS , Basic bash commands of Linux , Editors [GUI & CLI]

C0-2

Boot Process of Linux : What is booting and boot process of Linux? , Init Process or Runlevels.

Software Package Administration : Description of a Repository , Difference between RPM and YUM , Configuration of YUM server , Installing and deleting software packages , Querying and updating software packages . User and Group Administration : Types of Users in Linux , Creating and deleting Users and Groups , Modifying Users profile ,Adding Users into the Groups , Important system files related to User & Group , administration

C0-3

Advanced File Permissions , Disk Partitioning and Mounting File System , Logical Volume Management , Backup and Recovery , Configuring NFS server, NIS Servers and client, Configuring DNS primary server , Configuring Linux as DHCP Server, Configuring Physical IP Address, Configuring Virtual IP Address, Enabling & Disabling the Network Connections

C0-4

Web Server (Apache) : Basics of Web Service , Introduction to Apache , Configuring Apache for main site , Configuring Apache for multiple sites using IP-based, port based and name-based , Mail Server Configuration , Basics of Mail Servers , Configuring SMTP service using sendmail , Log Server Importance of logs , Configuring Syslog Messages, Samba Server

TEXT BOOKS:

1. Linux Administration: A Beginners Guide, Sixth Edition (Network Pro Library) Paperback - Import, 16 Feb 2012 by Wale Soyinka

REFERENCE BOOKS :

1.UNIX and Linux System Administration Handbook, by Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley.

2.Linux System Administration, by Tom Adelstein, Bill Lubanovic.

3. Automating Linux and Unix System Administration, by Nathan Campi, Kirk Bauer.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
03	20CA21030	Information Storage and Management	3	3-0-0-0	3

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Explain the types of storage and usage in different scenarios	PO1,PSO1	2
CO 2	Describe data centre designs	PO2, PSO1	2
CO 3	Compare different types of server farms	PO1,6, PSO1	3
CO 4	Discuss data centre construct and back-up/recovery technologies	PO1, PSO1	3

SYLLABUS:

C0-1

Introduction to Storage and Data Centers: Information Storage

Data - Types of Data -Information - Storage , Evolution of Storage Technology and Architecture - Managing Storage Infrastructure - Information Lifecycle Management - ILM Implementation and Benefits. Data Centers Overview - Data Center Goals and Facilities, Roles of Data Centers in the Enterprise and Service Provider Environment, Data Center Architecture - Data Center Requirements.

C0-2

Storage System Environment Host -Connectivity - Storage, Disk Drive Components - 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 **RAID and Storage Networking Technologies** : Implementation of RAID - Software RAID - Hardware RAID - RAID Array Component -RAID Levels

C0-3

Data Centre 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 Wire ways, Cable Trays, Design and Plan against Vandalism, Data Center Design Case Studies, Modular Cabling Design, Points of Distribution, ISP Network Infrastructure, ISP WAN Links, Data Center Maintenance

C0-4

Introduction to Server Farms Types of server farms and data center, data center topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, Data Center Transport Layer, Data Center Services.

TEXT BOOKS:

- 1.EMC Education Services, “Information Storage and Management: Storing, Managing, and Protecting Digital Information”, Wiley Publishing Inc., 1st edition, 2009.
- 2.Mauricio Arregoces, Maurizio Portolani, “Data Center Fundamentals”, Cisco Press, 2003

REFERENCE BOOKS:

- 1.Robert Spalding , “Storage Networks: The Complete Reference “, Tata McGraw Hill Publication, 2003
- 2.KailashJayaswal, “Administering Data Centers - Servers, Storage and Voice over IP”, Wiley Publishing Inc., 2006.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
04	20CA21040	Principles of Virtualization	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Describe cloud concepts and types of cloud	PO4,PSO1	2
CO 2	Apply Migration and governance in cloud	PO1,PSO1	3
CO 3	Enumerate basic concepts of Virtualization	PO1, PSO1	3
CO 4	Apply deployment of VMWare	PO4,8, PSO1	3
CO5	Install Virtual PC ,create and manage virtual hard disks	PO3,4, PSO1	3

SYLLABUS:

C0-1

Introduction

Introduction to Virtualization - Types of virtualization - Difference between cloud and virtualization - Physical infrastructure and virtual infrastructure - Virtualization approaches - Partitioning - Hosting - Isolation - Hardware independence - Virtual machine - Hypervisor - Types of hypervisor - Virtual machine manager - Types of hypervisor - Introduction to datacenter virtualization Esxi - Difference between Esxi and Esx - Versions of Esxi - Installation and configuration of Esxi 6.0 - vSphere 6.0

C0-2

Components of VMware vSphere - vSphere 6.0: Overview and Architecture - Topology of vSphere 6.0 Data Center - vSphere 6.0 Configuration MaximumsvCenter Server - vCenter Server Features - Certificate Management - Alarms and Alerts - Monitoring Features - Template Management - Linked Mode Deployment - Storage Features in vSphere - Shared Storage - Storage Protocols - Datastores - Virtual SAN - Virtual Volumes - Networking Features in vSphere - Virtual Networking - Virtual Switches and its types

C0-3

Features of vSphere and NSX vSphere Resource Management Features - vMotion - Distributed Resource Scheduler (DRS) - Distributed Power Management (DPM) - Storage vMotion - Storage DRS - Storage I/O Control - Network I/O Control - vSphere Availability Features - vSphere Data Protection - High Availability - Fault Tolerance - vSphere Replication - Introduction to NSX.

C0-4

vSphere Solutions to Data Center Challenges and vSphere Security

Challenges - Availability Challenges - Scalability Challenges - Management Challenges - Optimization Challenges - Application Upgrade Challenges - Cloud Challenges - Security - Describe the features and benefits of VMware Platform Services Controller - Configure ESXi host access and authorization - Secure ESXi - vCenter Server - and virtual machines - Upgrade ESXi and vCenter Server instances

TEXT BOOKS:

- 1.Virtualization Essentials Paperback - 26 Apr 2012 by Matthew Portnoy - wiley publications
- 2.VMware Cookbook Paperback - 17 Jul 2012 by Troy - Shroff/O'Reilly; Second edition (17 July 2012).

REFERENCE BOOK:

- 1.Mastering VMware vSphere 5.5 (SYBEX) Paperback - 2014 by Scott Lowe, Nick Marshall, Forbes Guthrie , Matt Liebowitz , Josh Atwell - Wiley (2014) edition.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
05	20CA21050	Network & Information Security	4	3-1-0-0	4

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Explain various information security concepts	PO1,PSO1	2
CO 2	Discuss the need for information security in the internet, and how to manage the risks.	PO1,PSO1	2
CO 3	Summarize how to identify and access risks	PO3,6,PSO1	2
CO 4	Describe network infrastructure security and how to monitor a network	PO3,6,PSO1	2

SYLLABUS:

CO-1

Introduction : Security Definition, Why Security, Security and its need, Current Trends and Statistics, Basic Terminology, The CIA of Security
User identity and Access Management: Authentication, Account Authorization, Validation, Access Control and Privilege management. Encryption and Decryption..

CO-2

System and Server Security : System Security, Desktop & Server Security, Firewalls, Password cracking Techniques, Key-logger, viruses and worms, Malwares & Spy wares, Windows Registry, Vulnerability Assessment, Penetration Testing, Risk Assessment, Threat, Vulnerability.

CO-3

Network Security: Overview of Network Security, Access Control, Security features on Switches, Firewall, Types of firewall, Access Management, Authentication, NAC .Network Intrusion Prevention Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS high Availability; host Intrusion Prevention; Anomaly Detection and Mitigation.

CO-4

Network Management : Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies

TEXT BOOKS:

- 1.Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010
- 2.Network Security Bible by Eric Cole, Wiley; Second edition (2009)

REFERENCE BOOKS:

1. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)
2. Network Security. Principles And Practice. Fifth Edition. William Stallings. Prentice Hall.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
06	20UC21030	Professional Communication Skills	2	2-0-0-0	2

COURSE OUTCOMES:

CO NO	Course Outcome (CO)	PO/PS O	Blooms Taxonomy Level (BTL)
CO1	Developing Vocabulary and Verbal Skills	PO12	2
CO2	Discovering different interpersonal skills to develop people skills	PO12	2
CO3	To enhance the problem-solving skills of the students through the concepts of Simple Equations, Ratio, Proportion & Variation, Percentages, Profit & Loss, Averages, Allegations, Simple & Compound Interest which will enable them to improve their problem solving abilities which in turn improve their programming skills.	PO5	2
CO4	Apply diagrammatic representation of the given data to find the possible outcomes in the topics of Deductions, Cubes, Venn Diagrams and Arrangements	PO2	2

Syllabus:

COMPETENCY: 1

Spotting Errors
Sentence Rearrangements 300 word list
Cloze Test

COMPETENCY: 2

SWOC-1
Self awareness Grooming
Portfolio Management
Group Discussion

COMPETENCY: 3

Quantitative Aptitude:

Simple Equations, Ratio Proportion & Variation Percentages
Profit & Loss Averages Allegations
Simple & Compound Interest

COMPETENCY: 4

Reasoning

Deductions Cubes
Venn Diagrams Linear arrangements Circular arrangements
Ordering and Sequencing Selections

Reference Books:

- R1. Soft Skills by Dr. Alex S CHAND Publications R2. Objective English by Showarick Thrope, Pearson
R3. Quantitative Aptitude by R S Agarwal, S CHAND Publications. R4. Quantitative Aptitude by Abhijit Guha, Mc Graw Hills.
R5. Verbal and Non-Verbal Reasoning, R. S. Aggarwal, S Chand Publications.
R6. R S Agarwal, SChand, 'A modern approach to Logical reasoning' GL Barron's, McGraw Hills

Web Links:

www.indiabix.com
www.freshersworld.com www.managementparadise.com www.coolavenues.com
www.indiaedu.com/entrance-exams/cat.../books.html www.mycatprep.com
www.bookboon.com

IV Semester

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
01	20UC0010	Universal Human Values & Professional Ethics	2	2-0-0-0	2

COURSE OUTCOMES:

CO#	Course Outcome	PO/PSO	BTL
CO1	Understand and identify the basic aspiration of human beings	PO6	2
CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.	PO6	3
CO3	Analyze the profession and his role in this existence.	PO6	4

SYLLABUS :

Introduction to Value Education: Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity - The Basic Human Aspirations, Right Understanding, Relationship and Physical Facilities, Happiness and Prosperity - Current Scenario, Method to fulfill the Basic Human Aspirations.

Harmony in the Human Being: Understanding the Human Being as Co-existence of Self ('I') and Body, Discriminating between the Needs of the Self and the Body, The Body as an Instrument of 'I', Understand Harmony in the Self ('I'), Harmony of the Self ('I') with the Body, Program to Ensure Sanyam and Svasthya.

Harmony in the Family and Society: Harmony in the Family - the Basic Unit of Human Interaction, Values in Human-to-Human Relationships, 'Trust' - the Foundational Value in Relationships, 'Respect' - as the Right Evaluation, Understand Harmony in the Society, Vision for the Universal Human Order.

Harmony in the Nature (Existence): Understand Harmony in the Nature, Interconnectedness, Self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing 'Existence is Co-existence' at All Levels, The Holistic Perception of Harmony in Existence.

Implications of the Right Understanding - a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models - Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

TEXT BOOK :

1. A Foundation Course in Human Values and Professional Ethics - R R Gaur, R Sangal and G PBagaria, First Edition, Excel Books.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
02	20UC22010	Installation and Configuration of Server	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Explain the components of Windows Server and their functions	PO1,4,6, PSO1	2
CO 2	Discuss how to configure networking and network services	PO1, 4, PSO1	2
CO 3	Explain how to configure and manage Active Directory Domain Services	PO1,4, PSO1	2
CO 4	Apply the functions of the Sub elements of the various components of Windows	PO6, PSO1	3

CO 5	Deploying Windows Server Update Services	PO1, PSO1	3
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SYLLABUS:

CO-1

Installing and Configuring Windows Server 2012

Introduction, Selecting & Installing a Windows Server ,Server Roles and Features, Licensing, Server Core : Defaults, Capabilities, Completing Post-Installation Tasks, Converting Between GUI and Server Core, Upgrade paths, Installing Windows Server Migration Tools, Configuring NIC Teaming, Configuring local storage, Configuring WDS to install OS through networking.

CO-2

Securing Files and Disks : How to Securing Files, Encryption files with EFS, Configuring EFS, Using the Cipher Command, Sharing Files Protected with EFS with others, Configuring EFS with Group Policies, Configuring EFS Recovery Agent, Managing EFS Certificates, Encrypting Files with BitLocker, Configuring BitLocker Encryption, configuring BitLocker to Go, Configuring BitLocker Policies, Managing BitLocker Certificates

CO-3

Configuring DNS Zones and Records

DNS and Zones, Address Resolution Mechanism, configuring and Managing DNS Zones, Installing DNS, Primary and Secondary Zones, Active Directory-Integrated Zones, Zone Delegation, Stub Zones, Caching-Only Servers, Forwarding and Conditional Forwarding, DNS Record types, creating and Configuring DNS Resource Records, Start of Authority(SOA) Records, Name Server(NS) Records, Host(A and AAAA) Records, Canonical Name(CNAME) Records, Pointer(PTR) Records

CO-4

Implementing Patch Management and Monitoring Server Performance

Understanding windows Updates and Automatic Updates, Deploying Windows Server Update Services(WSUS), How to Install and Configure WSUS, Configuring WSUS Synchronization, Configuring WSUS Computer Groups, Configuring Group Policies.

TEXT BOOKS:

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

REFERENCE BOOK:

1. Administering Widows Server 2012 by Patrick Regan
2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, and Robert Butler.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
03	20CA22020	Digital Forensics	4	4-0-0-0	4

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Explain Forensics in Information Technology World	PO3, 4, PSO1	2
CO 2	Discuss different data recovering methods	PO3, 4, PSO1	2
CO 3	Identify various forensics techniques and their working	PO3, 6, PSO1	3
CO 4	Make use of cyber laws and describe them	PO3, 6, PSO1	3

CO 5	Apply and practice programs on digital forensics	PO3, 6	3
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SYLLABUS:

C0-1

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

Storage Devices & Data Recover Methods : Data Acquisition, Data deletion and data recovery method and techniques, volatile data analysis, Case Studies

C0-2

Forensics Techniques I : Windows forensic, Linux Forensics, Network forensics - sources of network-based evidence, other basic technical fundamentals, Network forensic investigative strategies, technical aspects, statistical flow analysis, packet analysis, forensics of wireless networks, network intrusion detection analysis, event log aggregation and correlation analysis, switches, routers and firewalls, Case Studies, Mobile Forensics - data extraction & analysis, Steganography, Password cracking, Case Studies

C0-3

Forensics Techniques II : Cross-drive analysis, Live analysis, deleted files, stochastic forensics, Dictionary attack, Rainbow attack, Email Tacking - Header option of SMTP, POP3, IMAP, examining browsers, Case Studies

C0-4

Cyber Law: Corporate espionage, digital evidences handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment), Case Studies, Incident specific procedures

TEXT BOOKS:

- 1.Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1sted; 2015
- 2.Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1sted; 2016

REFERENCE BOOKS:

- 1.Hacking Exposed Computer Forensics by Aaron Philipp, David Cowen, McGraw Hill, 2nded; 2009
- 2.Mastering Mobile Forensics by SoufianeTahiri, Packt Publishing, 1sted; 2016
- 3.Computer Forensics: A Beginners Guide by David Cowen, McGraw Hill, 1sted; 2013

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
04	20CA22030	Cloud computing fundamentals	4	4-0-0-0	4

COURSE OUTCOMES:

CO. No.	Course Outcome	Mapped PO	BTL
CO 1	Describe cloud concepts and types of cloud	PO1,4,8,PSO1	2
CO 2	Explain how to perform cost management	PO4,8, PSO1	2
CO 3	Identify the need for IT governance in cloud	PO4, PSO1	2

CO 4	Study and report various cloud services	PO4,8, PSO1	3
CO 5	Study and report various cloud services	PO4,8, PSO1	3

SYLLABUS:

Fundamentals of Cloud Computing : Cloud Computing Basics - History of Cloud Computing, Characteristics of Cloud Computing, Need for Cloud computing, Advantages and Possible Disadvantages of cloud computing, Cloud Deployment Models - Public, Private, Hybrid, Community, Other deployment Models. Evolving Data Center into Private Cloud, Datacenter Components, Extracting Business value in Cloud Computing - Cloud Security, Cloud Scalability, Time to Market, Distribution over the Internet, Cloud Computing Case Studies.

Cloud Delivery Models : Introduction to Cloud Services, **Infrastructure as a Service (IaaS)** - Overview, Virtualization, Container, Pricing Models, Service Level Agreements, Migrating to the Cloud, IaaS Networking options, Virtual Private Cloud(VPC), IaaS Storage - File and Object storage, Data Protection, IaaS security, Benefits, Risks and Examples of IaaS. **Platform as a Service (PaaS)** - Overview, IaaS vs PaaS, PaaS Examples, benefits and risks. **Software as a Service (SaaS)** - Introducing SaaS, Evaluating SaaS - user and vendor perspective, Impact of SaaS, Benefits and risks of SaaS.

Cloud Providers 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.

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, Case Studies

TEXT BOOKS:

- 1.Kirk Hausman, Susan L. Cook, TelmoSampaio, “ CLOUD ESSENTIALS CompTIA® Authorized Courseware for Exam CLO-001”, John Wiley & Sons Inc., 2013
- 2.Judith Hurwitz , Robin Bloor , Marcia Kaufman , Fern Halper, “Cloud Computing for Dummies”, Wiley Publishing Inc., 2010

REFERENCE BOOKS:

- 1.Erl,” Cloud Computing: Concepts, Technology & Architecture”, Pearson Education, 2014
- 2.Srinivasan, “Cloud Computing: A Practical Approach for Learning and Implementation “Pearson.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
05	20CA22040	Software Engineering	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Discuss the need for following a well-structured format for the development of software applications	PO1, PSO1	2
CO 2	Illustrate how to reduce the complexity to transition from one phase in software development to another.	PO3, PSO1	2

CO 3	Summarize different testing concepts	PO4, PSO1	3
CO 4	Identify how to manage a software development project	PO4,8, PSO1	3

SYLLABUS:

CO 1: Software and Software Engineering: Nature of software, software application domains, unique nature of web applications, software engineering, software process, software engineering practice, software myths.

CO 2: Process Models: Generic process model, prescriptive process models, specialized process models, unified process, personal and team process models, product and process, Reverse Engineering: Reverse Engineering to Understand Data, Reverse Engineering to Understand Processing, Reverse Engineering User Interfaces.

CO 3: Understanding Requirements: Identify stakeholders, recognizing multiple viewpoints, eliciting requirements, Building requirement model, negotiating requirements, validating requirements, SRS Vs User Stories. Agile Modeling, Extreme Programming, Scrum, Kanban, SAFe Methodology.

CO 4: Test Driven Development: Basics, A strategic approach to software testing, strategic issues, test strategies for conventional software, Black-Box and White-Box testing, validation testing, system testing.

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering - A Practitioner's Approach" 7th Edition, Mc Graw Hill, (2014).

2. Ian Sommerville, "Software Engineering", Tenth Edition, Pearson Education, (2015).

3. Agile and Iterative Development: A Manager's Guide, Craig Larman, Addison-Wesley

REFERENCE BOOKS:

1. Craig Larman, "Applying UML and Patterns: An introduction to OOAD and design and interface deployment", Pearson, (2005).

2. Stephen R. Schach, "Software Engineering", Tata McGraw-Hill Publishing Company

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
06	20CA22050	Cloud Web Services	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Understand the model of Cloud Computing As A Service	PO4, 8, PSO1	2
CO 2	Understand the Networking Basics required for cloud services	PO4,8, PSO1	2

CO 3	Demonstrate the Control of workflow in cloud services	PO4, PSO1	2
CO 4	Explain the method of fault tolerance in cloud	PO4, 8, PSO1	2
CO 5	Experiment with the cloud	PO4, 8, PSO1	3

SYLLABUS:

Cloud Web concepts : Search engine, Apache Hadoop, Grid Computing, Amazon Web Services, REST APIs, SOAP API, Query API, User Authentication, Connecting to the Cloud, Open SSH Keys, Tunneling / Port Forwarding, Image (glance), Object Storage (swift), ACL, Logging, Signed URI, Compute (nova), Cloud value proportion, Cloud economics, cloud architecture and design principles, AWS Cloud basic services.

Networking & Storage : Overview, Key pairs, Network Types, LAN, Gateways and Router, IP Classes and Subnets, CIDR, Utilities, Instances Management, Image Management, direct connect, hybrid deployments, VPN, Security groups, Block Storage (cinder), Ubuntu in the Cloud, Installation, Utilities, File system, basic concepts of storage and databases, various storage services, storage solutions, database services.

Global Infrastructure and Security: Methods of deploying and operating cloud, global infrastructure, availability zone, benefits of CloudFront and Edge locations. AWS Core services, resources for technology support, methods for provisioning services, Benefits of shared responsibility model, layers of security, Multi Factor Authentication, Identity Access Management Security levels, security policies, benefits of compliance, security services.

Monitoring & Pricing: Approaches for monitoring, benefits of Cloud watch, CloudTrail, Trust Advisor, Pricing and support model, free tier, benefits of organization and consolidated billing, Budgets, Explorer, AWS pricing calculator, various AWS support plans, AWS market place.

TEXT BOOKS:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011
2. OpenStack Essentials by Dan Radez (Author)

REFERENCE BOOKS:

1. OpenStack Cloud Computing Cookbook - Third Edition by Egle Sigler, Cody Bunch, Kevin Jackson
2. Cloud Computing Explained: Implementation Handbook for Enterprises, John Roton, Recursive Press (November 2, 2009).

V Semester

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
01	20CA31010	Cloud Information Security	4	3-1-0-0	4

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
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CO 1	Explain importance of Information Security in the Cloud Context	PO2,4,PSO1	2
CO 2	Discuss various concepts of cloud security	PO3,6, PSO1	2
CO 3	Develop the cloud vulnerabilities and threats	PO4,7, PSO1	3
CO 4	Identify how cloud and Security works in a seamless model	PO4,8, PSO1	3

SYLLABUS:

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

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

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

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

TEXT BOOK :

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

REFERENCE BOOKS:

1. Visible Ops Private Cloud - Andi Mann, Kurt Miline and Jeanne Morain, IT Process Institute, Inc.; first edition (April 8, 2011)

2. Cloud Computing Explained - John Rhoton 2009

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
02	20CA31020	Cloud Deployment	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Understand the service delivery models	PO4, 8, PSO1	2

CO 2	Understand the foundational infrastructure services, including VPC, Elastic Compute Cloud (EC2)	PO4, 8, PSO1	2
CO 3	Apply management tools	PO4, 8, PSO1	3
CO 4	Experiment with VPC, Internet Gateway, a Security Group, a VPN	PO4, 8, PSO1	3
CO 5	Develop and deploy sample applications on cloud	PO4, 8, PSO1	3

SYLLABUS:

Services : Compute, Storage, Database:

Compute: EC2, Lightsail, Lambda, batch, EBS, Serverless, AWS Outposts, Storage: S3, EFS, FSx, S3 Glacier, Storage gateway, AWS Backup, Database: RDS, DynamoDB, ElasticCache, Neptune, Amazon QLDB, Amazon DocumentDB, Keyspaces, Timestream.

Services: Migration and Transfer, Network, IAM:

Migration and transfer: AWS Migration Hub, Database & Server Migration service. Network & Content Delivery: VPC, CloudFront, Route53, API Gateway, Direct Connect, Global Accelerator. Management & Governance: AWS organizations, CloudWatch, AWS Auto Scaling, CloudFormation, Config. Security, Identity & Compliance: IAM, Resource Access manager, AWS Single Sign-on, Key Management Services.

Identity access Management & S3:

Identity access management, S3 Bucket, S3 pricing Tire, S3 Security and encryption, Versioning control, S3 lock policies and vault lock, S3 Performance, AWS Organizations, Sharing s3 buckets between accounts, Cross region Replication, Transfer Acceleration, Data sync overview, CloudFront, Snowball, Storage gateway.

Amazon EC2 & Network Security:

EC2, Security group, Elastic Bean Stalk(EBS), Volumes and Snapshots, AMI Types, ENI vs ENA vs EFA, Encrypted Root Device volumes & Snapshots, EC2 Hibernate, Cloud Watch, AWS Command line, IAM roles with EC2, Bootstrap Scripts, Elastic File System, FSx for Windows and FSx for Lustre, EC2 Placement Groups, HPC on AWS, AWS Web Application Firewall, VPC's, HA Architecture, Security and Serverless

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
03	20CA31030	Design and Development of Cloud Applications	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Understand the basic concept of hybrid cloud	PO1,4,8,PSO1	2

CO 2	Understand the management of hybrid cloud in terms of development and deployment	PO4,8, PSO1	2
CO 3	Plan the establishment of hybrid plan	PO4, PSO1	3
CO 4	Apply the usage of Azure as a platform for hybrid cloud	PO4,8, PSO1	3

SYLLABUS:

DESIGNING CLOUD BASED APPLICATIONS: Role of business analyst, requirements gathering, UML, use of state diagrams, wire frame prototypes, use of design tools such as Balsamiq. Selecting front end technologies and standards, Impact of growth in mobile computing on functional design and technology decisions.

CLOUD APPLICATION DEVELOPMENT: Technical architecture considerations - concurrency, speed and unpredictable loads. Agile development, team composition (including roles/responsibilities) working with changing requirements and aggressive schedules. Understanding Model View Controller (MVC). Session management. Advanced database techniques using MySQL and SQL Server, blob storage, table storage. Working with Third Party APIs: Overview of interconnectivity in cloud ecosystems. Working with Twitter API, Flickr API, Google Maps API. Advanced use of JSON and REST.

CLOUD APPLICATIONS AND SECURITY ISSUES : Understanding cloud based security issues and threats (SQL query injections, common hacking efforts), SSL, encrypted query strings, using encryption in the database. Authentication and identity. Use of OAuth. OpenID; Understanding QA and Support: Common support issues with cloud apps: user names and passwords, automated emails and spam, browser variants and configurations. Role of developers in QA cycle. QA techniques and technologies. Use of support forums, trouble ticketing

USE CASES : Design, develop and deploy an advanced cloud app using framework and platform of choice to demonstrate an understanding of database, presentation and logic. Application should demonstrate integration with third party API, sensitivity to geography of user (language, currency, time and date format), authentication of user, security, and awareness of client device/browser. Case Studies: Salesforce, Basecamp, Xero.com, Dropbox.

TEXT BOOKS:

1. Judith Hurwitz , Marcia Kaufman , Fern Halper , Daniel Kirsch, “ Hybrid Cloud for Dummies“, John Wiley & Sons Inc., 2nd Edition, 2012

REFERENCE BOOKS:

1.Danny Garber, “Windows Azure Hybrid Cloud”, “, John Wiley & Sons Inc., 2013

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
04	20CA3104	Malware Analysis	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
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CO 1	Understanding Goals of Malware Analysis	PO4, PSO1	2
CO 2	Representing X86 Architecture	PO4, 8, PSO1	2
CO 3	Understanding Traces of Malware	PO4, 8, PSO1	3
CO 4	Analyzing process of Malware	PO4, 8, PSO1	3

SYLLABUS:

CO 1:

Goals of Malware Analysis, AV Scanning, Hashing, Finding Strings, Packing and Obfuscation, PE file format, Static, Linked Libraries and Functions, Static Analysis tools, Virtual Machines and their usage in malware analysis, Sandboxing, Basic dynamic analysis, Malware execution, Process Monitoring, Viewing processes, Registry snapshots, Creating fake networks,

CO 2:

X86 Architecture- Main Memory, Instructions, Opcodes and Endianness, Operands, Registers, Simple Instructions, The Stack, Conditionals, Branching, Rep Instructions, Disassembly, Global and local variables, Arithmetic operations, Loops, Function Call Conventions, C Main Method and Offsets. Portable Executable File Format, The PE File Headers and Sections, IDA Pro, Function analysis, Graphing, The Structure of a Virtual Machine, Analyzing Windows programs, Anti-static analysis techniques, obfuscation, packing, metamorphism, polymorphism.

CO 3:

Live malware analysis, dead malware analysis, analyzing traces of malware, system calls, api calls, registries, network activities. Anti-dynamic analysis techniques, VM detection techniques, Evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching

CO 4:

Downloaders and Launchers, Backdoors, Credential Stealers, Persistence Mechanisms, Handles, Mutexes, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection, YARA rule-based detection.

TEXT BOOKS:

1. "Practical Malware Analysis" by Michael Sikorski and Andrew Honig
2. "The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System" Second Edition by Reverend Bill Blunden
3. "Rootkits: Subverting the Windows Kernel" by Jamie Butler and Greg Hoglund
4. "Practical Reverse Engineering" by Dang, Gazet, Bachaalany
5. Windows Malware Analysis Essentials by Victor Marak, Packt Publishing, 2015

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
05	20CA31050	Ethical Hacking	4	3-0-2-0	5

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
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CO 1	Explain the concepts and types of Ethical Hacking	PO3, PSO1	2
CO 2	Using tools create hack in scenarios	PO1, 2, 3, PSO1	2
CO 3	Experiment with how to perform web hacking	PO1, 3, PSO1	3
CO 4	Develop report writing and mitigation	PO3, PSO1	3
CO 5	Apply the concepts of ethical hacking using tools and techniques	PO1, 3, PSO1	3

SYLLABUS:

CO 1:

Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, and Foot printing and scanning: Foot printing, scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques

CO 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

CO 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.

CO 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

TEXT BOOKS:

- 1.Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback - 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017)
- 2.CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016)

REFERENCE BOOKS:

- 1.Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017)
- 2.An Ethical Guide To WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August 2014) Hands-On Ethical Hacking and Network

VI Semester

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
01	20CA32010	Configuration Management on Cloud	4	4-0-0-0	4

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
CO 1	Understand Technology management and development	1, 6	2
CO 2	Understand technology absorption and assessment	1, 6	2
CO 3	Apply Technology diffusion and Information system	3, 6	3
CO 4	Apply Technology at Enterprise level and Global IT strategies	1, 6	3

SYLLABUS:

CO 1: Introduction, Automation in the Cloud, Cloud Services Overview, Scaling in the Cloud, Evaluating the Cloud, Migrating to the Cloud.

CO 2: Spinning up VMs in the Cloud, Creating a New VM Using the GCP Web UI, Customizing VMs in GCP, Templating a Customized VM, Managing VMs in GCP, Cloud Scale Deployments, Orchestration, Cloud Infrastructure as Code.

CO 3: Managing Cloud Instances at Scale : Storing Data in the Cloud, Load Balancing, Change Management, Understanding Limitations, Getting Started with Monitoring, Getting Alerts When Things Go Wrong, Service-Level Objectives.

CO 4: Basic Monitoring in GCP , What to Do When You Can't Be Physically There ,Identifying Where the Failure Is Coming From , Recovering from Failure , Debugging Problems on the Cloud , The Driving Principles of Configuration Management , Automating with Configuration Management

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
02	20CA32020	Secure Software Design	4	4-0-0-0	4

COURSE OUTCOMES:

CO#	CO Description	PO/PSO	BTL
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CO1	Discuss Security is a Software Issue and what makes Software Secure	PO2 / PSO2	2
CO2	Estimate the Requirements Engineering of Secure Software	PO3 / PSO2	3
CO3	Analyze Software Security Practices and Knowledge & SDLC	PO4 / PSO2	4
CO4	Analyze System Assembly Challenges, Governance and Management	PO3,PO4/ PSO2	4

SYLLABUS

Fundamentals and requirement level analysis: Introduction, background Software security life cycle Software quality attributes Security requirement gathering principles and guidelines, Design in different SDLCs, Interfacing with Requirements and Implementation, A case study.

Vulnerabilities during implementation, consequences, and prevention, consideration for legacy C applications and web applications) Buffer overflow, Format string bug SQL Injection, Cross-site Scripting Cross-site Request Forgery Session management Replication of vulnerabilities and exploitation Secure programming for preventing BOF, FSB, SQLI, XSS, session

Using the CVE and CWE on-line databases to assess threats and mitigations, Introduction to Threats and Mitigations, Open source threat and mitigation information, Medical analogies, Open source threat and mitigation information, Active vs Passive security, Security testing (black box and white box).

Design and testing for security : Secure software design principles , Secure software design is good software design Static analysis techniques Security as a build-on, not an add-on , The role of Architecture in Design , Permitted Activities that Can Cause Problems, best practices, consequences of a bad design, Therac-25 Case Study.

TEXTBOOKS:

1. Secure and Resilient Software, Mark Merkow and Lakshmikanth Raghavan, CRC Press, ISBN 9781439826973.

2. Software Security Engineering: A Guide for Project Managers, by Julia H. Allen, Sean J. Barnum Robert J. Ellison, Gary McGraw, Nancy R. Mead, ISBN-10: 032150917X • ISBN13: 9780321509178, Pearson Education.

Sl.No.	Course Code	Course title	Credits	L-T-P-S	CH
03	20CA32030	Major Project	15	0-0-30-0	15

COURSE OUTCOMES:

CO. No	Course Outcome	Mapped PO	BTL
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CO 1	Understand basic concepts learnt to solve real-time problems	PO2, PSO1	2
CO 2	Discuss the IT organization hierarchy and working	PO7, PSO1	2
CO 3	Identify the tools/network and their functionalities to create and test application/connectivity	PO7, PSO1	2
CO 4	Summarize the procedures used for creating and testing applications	PO3, 6, PSO1	3
CO 5	Develop real time applications	PO2, PSO1	3

The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.

If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.

Bridge Course:

The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through a week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.

The Project:

Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.

Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.