School of Applied Sciences

Centurion University of Technology & Management

B.Sc. in Information Technology

(Specialization in Cloud Technology and Information Security)

(Three years program)

2019

SEMESTER I				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-P	Credits
1	FCBS 0101	Environmental Science	2+0+0	2
2	BCTI 1108	Problem Solving and Programming in C	4+2+0	6
3	BCTI 1109	Computer Networks	4+2+0	6
4	BCTI 1110	Computer Organization & Architecture	4+2+0	6
5	**Inter Disciplinary Subjects**	Generic Elective – 1		6
		Total		**26**

SEMESTER II				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-P	Credits
1	BSFL1101	English	2+0+0	2
2	BCTI 1202	Database Management System	4+2+0	6
3	BCTI 1205	Object Oriented Programming using JAVA	4+2+0	6
4	BCTI 1106	Operating System	4+2+0	6
5	**Inter Disciplinary Subjects**	Generic Elective – 2		6
		Total		**26**

SEMESTER III				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-P	Credits
1	BCTI 2302	Principles of Virtualization	4+2+0	6
2	BCTI 2308	Information and Network Security	4+2+0	6
3	BCTI2305	IT Governance, Risk and Information Security Management	2+0+0	2
4	BCTI2306	Data Structures & Algorithms	4+2+0	6
6	BCTI2307	Introduction to Web Technology	4+2+0	6
		Total		**26**

SEMESTER IV				
Sl. No.	**Subject Code**	**Subject Name**	**Subject Type T-P-P**	**Credits**
1	BCTI2406	Linux Administration	4+2+0	6
2	BCTI0402	Ethical Hacking Fundamentals	4+2+0	6
3	BCTI3505	Python Programming	4+2+0	6
4	BCTI 2303	Introduction to Cloud Technology	4+2+0	6
5	BCTI 2408	Design & Analysis of Algorithms	3+0+0	3
		Total		**27**

SEMESTER V				
Sl. No.	**Subject Code**	**Subject Name**	**Subject Type T-P-P**	**Credits**
1	BCTI2403	Designing Enterprise Network	4+2+0	6
2	BCTI3502	Installation and configuration of Server	4+2+0	6
3	BCTI2408	Fundamentals of Storage & Data Center	4+0+0	4
4	BCTI3506	Virtualization and cloud Security	4+0+0	4
5	BCTI3507	Logical Reasoning & Thinking	2+0+0	2
6	BCTI3508	Life Skills Development (LSD)-IV	0+2+0	2
		Total		**24**

SEMESTER VI				
Sl. No.	**Subject Code**	**Subject Name**	**Subject Type T-P-P**	**Credits**
1	BCTI3605	Information Technology Infrastructure Library	3+0+0	3
2	BCTI3606	Digital forensics	4+2+0	6
3	BCTI3607	Cloud Infrastructure Solutions	4+2+0	6
4	BCTI3608	Software Engineering	3+0+0	3
5	BCTI3604	Project	0+0+6	6
		Total		**24**

Environmental Science

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Environmental Science	FCBS 0101	Theory	2-0-0	

1. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Semester University Examination	60	Written examination
Total		100	

2. Course Outlines

MODULE-I: **(12 Lectures)**

Environment and its multidisciplinary nature; Need for public awareness; Renewable and non - renewable resources–forest, water, mineral, land, food and energy resources; Structure and function of ecosystems of forest, grass land, desert and aquatic types.

MODULE-II: **(12 Lectures)**

Biodiversity and its conservation: Biodiversity at global, national and local levels; Threats to biodiversity - Habitat loss; wild life poaching and man - wildlife conflicts; Endangered and endemic species; conservation measures. Causes, effects and control measures of pollution, air, water and noise pollution; Nuclear hazards; solid-waste management–causes, effects and control measures; Management of disasters due to natural causes of floods, earthquakes, cyclones and landslides.

MODULE-III: **(12 Lectures)**

Social issues and the environment; Sustainable environment, Water conservation measures; Rain water harvesting; Resettlement and rehabilitation of people; Climate change and global warming; Acid rain; Ozone layer depletion; water land reclamation; Consumerism and waste products; Features of

Environment Protection Act, Air pollution and Control of Pollution Acts; Water Pollution and its Control Act. Effects of Pollution explosion on environment and public health; Need for value education to Protect environment and resources.

Text Book:

1**.** AnubhavKaushik& C.P. Kaushik : Environmental Studies-New age International Publishers.

Reference Books:

1. Benny Joseph : Environmental Studies-Tata Mac GrawHill

2. E. Bharucha : Text book of Environmental Studies for Under graduate courses– Universities Press. (Book prepared by UGC Committee.

Problem Solving and Programming in C

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Problem Solving and Programming in C	BCTI1108	Theory + Practice	4-2-0	Nil

1. Objective

- To provide basic knowledge of programming tools and techniques.
- To familiarize the programming environment and syntax of C programming.
- To understand the working of basic programming constructs.

2. Learning outcome

On successful completion of this course, students will be able to:

- Apply programming skills to problem solving.
- Write 150 to 200 line programs without any error.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam.	20	Lab work, report and viva
Total		100	

4. Course outline

MODULE-I: (20 Lectures)

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 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, typeconversion.

MODULE-II: (20Lectures)

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 . Dynamic data structures inC

: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-III: (12Lectures)

Additional features (12L):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.

5. Reference:

E-content: LMS
Content Text Books:

1.   Let us C by YashwantKanetkar, 6th Edition, PBPPublication

Reference Books:

1. The C programming Language by Richie and Kenninghan, 2004, BPBPublication
2. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGrawHill

Online Source:
  1. MIT opencourseware

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I (20 Lectures)				
Overview of Programming: Introduction to computer based problem solving, Program design and	**3**	Lecture	Assignment	Book, Online Source
implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement,				
Programming environment: Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters	2	Lecture	Assignment	Book, Online Source
Fundamentals of C programming: Overview of C, Data Types,	**5**+**3**	Lecture	Assignment	Book, Online Source

Constants & Variables,				
Operators & Expressions,				
Control constructs-if then,				
for, while loop.				
Arrays: single & multidimensional arrays.	4+3	Lecture	Assignment	Book, Online Source
Functions: Fundamentals, general form,	3+3	Lecture	Assignment	Book, Online Source
function arguments, return				
value.				
Basic I/O-formatted and Unformatted I/O, Advanced	**3+3**	Lecture	Assignment	Book, Online Source
features:				
Type modifiers and storage				
class specifiers for data				
types, Bit operators, ?				
operator, &operator, *				
operator, Type casting, type				
conversion.				
Module-II (20 Lectures)				
Advanced programming Techniques:	4+3	Lecture	Assignment	Book, Online Source

Control constructs: Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rulesof functions,				
Functions: Parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts,ex-Tower of Hanoi .	5+3	Lecture	Assignment	Book, Online Source
Dynamic data structures in C :Pointers:	**6+3**	Lecture	Assignment	Book, Online Source
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,	5+3	Lecture	Assignment	Book, Online Source
enumerated data-types, typedef.				
Module-III (12 Lectures)				
Additional features: File Handling: The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf,	6+3	Lecture	Assignment	Book, Online Source
C Preprocessor: #define, #include, #undef, Conditional compilation directives.	6+3	Lecture	Assignment	Book, Online Source
C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions				
Total (hrs)	52 +30			

Computer Networks

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Computer Networks	BCTI1109	Theory+ Practice	4-2-0	Nil

1. Objective

- To provide basic knowledge of Networking.

- To familiarize the Computer Network.

2. Learning outcome

- To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.

- To master the concepts of protocols, network interfaces, and   design/performance issues in local area networks and wide area networks,

- To be familiar with contemporary issues in networking technologies,

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam.	20	Lab work, report and viva
Total		100	

Module 1: Networking Fundamentals   12 Hours

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 (Fibre 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   **12 Hours**

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, EthernetComponents,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   **12 Hours**

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   **12 Hours**

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   **12 Hours**

Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the

affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools

Books for References:

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

List of Experiments:

1. Investigating TCP/IP protocol model.
2. Switch Configuration - Basic Commands and Switch Port Security
3. Design and analyses network with a router, Switch and Hub to find the number of broadcast domains and collision domain using packet tracer.
4. Router – Configuration and Setting up of Passwords.
5. PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication.
6. A configuration of default, Static and Dynamic Routing.
7. DHCP, DHCP Relay and DHCP Exclusions.
8. Configure a wireless network for ad-hoc and infrastructure mode.
9. Configure point to site and site to site VPN.
10. Perform network troubleshooting using ping, trace route, tracert, ipconfig, arp, nslookup, netstat, nbtstat.

Computer Organization & Architecture

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Computer Organization & Architecture	BCTI 1110	Theory+ Practice	4-2-0	Nil

1. Objective

- This course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system.

- This includes the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

- This course will also expose students to the basic architecture of processing, memory and i/o organization in a computer system.

2. Learning outcome

- Identify, understand and apply different number systems and codes.

- Understand the digital representation of data in a computer system.

- Understand the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.

- Understand computer arithmetic formulate and solve problems, understand the performance requirements of systems

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam.	20	Lab work, report and viva
Total		100	

4. Course outline

Module - I (5 Hrs)

Basic structures of Computers: Computer Architecture vs. Computer Organization, Functional units, operational concepts, Registers, Bus structures, Software, Performance.

Module-II (6 Hrs)

Machine Instruction and Programs: Memory location and addresses, Big-endian and Little-endian representation.

Memory Operations, Instructions and instruction Sequencing, Addressing modes, Assembly Language, Basic Input/output operations, subroutine, additional Instructions.

Module – III (6 Hrs)

Arithmetic : Addition and subtraction of signed Numbers, Design of Fast Adders, Multiplication of positive Numbers, Signed-operand multiplication , Fast multiplication, Integer Division, Floating- point Numbers, (IEEE754 s…) and operations.

Module – IV (5 Hrs)

Basic Processing units: Fundamental concepts, execution of complete Instructions, Multi bus organization, Hardwired Control, Micro Programmed Control, RISC vs CISC architecture.

Module – V (6 Hrs)

Memory System: Basic Concepts, cache Memory, Cache memory mapping policies, Cache updating schemes, performance consideration, Virtual memories, Paging and Page replacement policies, Memory Management requirement, secondary storage.

Module – VI (5 Hrs)

Microprocessors, Instruction set, Assembly Language Programming, Stack, Subroutine, Interrupt, Accessing I/O devices, Standard I/O Interfaces- RS-232C, IEEE-488, USB, Data Transfer techniques.

Module-VII (6 Hrs)

Instruction-Level Parallelism, Superscalar Processors, Design Issues, Pentium 4.

Parallel Processing**,** Multiple Processor Organizations, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors.

List of Experiments:

1. **Assembling & Dismantling of PC**

   a. To recognize various components of PC.

   b. Dismantling and assembling a PC.

2. **Installing Windows 10**

    a. Upgrading Windows 7 to Windows 10

    b.   Migrating User Settings 3 .

3. **Configuring Windows 10.**

    a. Using the Settings App .

    b. Using Control Panel

    c. Using Windows Power Shell

    d. Using GPOs .

4. **Synchronizing Settings with One Drive**

    a. Connecting a Microsoft Account.

    b. Synchronizing Settings between Devices

5. **Configuring Network Connectivity**

    a. Verifying and Testing IPv4 Settings

    b. Configuring Automatic IPv4 Settings

    c. Configuring and Testing Name Resolution

6. **Managing Storage**

    a. Adding a Disk

    b. Creating a Simple Volume

    c. Compressing a Folder

    d. Enabling Disk Quotas

    e. Creating a Storage Space

7. **Configuring and Managing Permissions and Shares**

    a. Creating, Managing, and Sharing a Folder

    b. Using Conditions to Control Access and Effective Permissions

8. **Installing and Managing a Printer**

    a. Managing and Using a Printer

9. **Configuring Windows 10 Web Browsers**

    a. Configuring and Using Microsoft Edge

    b. Configuring and Using Internet Explorer

10. **Troubleshooting and Recovery**

    a. Managing Device Drivers

    b. Using File History to Recover Files

    c. Using Previous Versions to Recover Files

    d. Recovering a Device with a Restore Point

    e. Using the Advanced Start-up Options to Recover a Device

5. Reference

E-content: LMS Content

Text Books:

- Computer Organization:Carl Hamacher, Zvonkovranesic, Safwat Zaky,Mc Graw Hill,5th Ed
- Computer Organization and Design Hardware/ Software Interface: David A. Patterson, John L. Hennessy, Elsevier, 4th Edition.

Reference Books:

- Computer Architecture and Organization: William Stallings, Pearson Education.
- Computer Architecture and Organizations, Design principles and Application: B. Govinda Rajalu, Tata McGraw-Hill Publishing company Ltd.
- Computer Architecture: Parhami, Oxford University Press
- Computer system Architecture: Morris M. Mano PHI NewDelhi.
- Computer Architecture and Organization: John P. Hayes Mc Graw Hill introduction.
- Structured Computer Organization: A.S. Tanenbum, PHI
- Computer Architecture And Organization: An Integrated Approach, Murdocca, Heuring Willey India, 1st Edition .

Online Source:

- https://www.coursera.org/learn/comparch

- https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/

- https://inspirit.net.in/books/academic/Computer%20Organisation%20and%20Architecture%208e%20by%20William%20Stallings.pdf

- https://en.wikipedia.org/wiki/Computer_architecture

6. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I (5 Hrs Lectures + 2 Hrs Practice)				
Basic structures of Computers: Computer Architecture vs. Computer Organization, Functional units,	3+2	Lecture+ Practice	Assignment	Book, Online Source
Operational concepts, Registers, Bus structures, Software, Performance.	2	Lecture	Assignment	Book, Online Source
Module-II (6 Hrs Lectures + 4 Hrs Practice)				
Machine Instruction and Programs: Memory location and addresses, Big-endian and Little-endian representation.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Memory Operations, Instructions and instruction Sequencing, Addressing modes.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Assembly Language, Basic Input/output operations, subroutine, additional Instructions.	2	Lecture	Assignment	Book, Online Source
Module-III (6 Hrs Lectures + 4 Hrs Practice)				
Arithmetic: Addition and subtraction of signed Numbers, Design of Fast Adders.	2+2	Lecture+ Practice	Assignment	Book, Online Source

Multiplication of positive Numbers, Signed-operand multiplication, Fast multiplication, Integer Division.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Floating- point Numbers, (IEEE754 s…) and operations.	2	Lecture	Assignment	Book, Online Source
Module-IV (5 Hrs Lectures + 2 Hrs Practice)				
Basic Processing units: Fundamental concepts, execution of complete Instructions, Multi bus organization.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Hardwired Control, Micro Programmed Control, RISC vs CISC architecture.	3	Lecture	Assignment	Book, Online Source
Module-V (6 Hrs Lectures + 4 Hrs Practice)				
Memory System: Basic Concepts, cache Memory, Cache memory mapping policies, Cache updating schemes, performance consideration,.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Virtual memories, Paging and Page replacement policies.	2	Lecture	Assignment	Book, Online Source
Memory Management requirement, secondary storage.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Module-VI (5 Hrs Lectures + 4 Hrs Practice)				
Microprocessors, Instruction set, Assembly Language Programming, Stack, and Subroutine.	3+2	Lecture+ Practice	Assignment	Book, Online Source
Interrupt, Accessing I/O devices, Standard I/O Interfaces- RS-232C, IEEE-488, USB, Data Transfer techniques	2+2	Lecture+ Practice	Assignment	Book, Online Source

Module-VII (6 Hrs Lectures +4 Hrs Practice)				
Instruction-Level Parallelism, Superscalar Processors, Design Issues, Pentium 4.	3+2	Lecture+ Practice	Assignment	Book, Online Source
Parallel Processing**,** Multiple Processor Organizations, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors.	2+2	Lecture+ Practice	Assignment	Book, Online Source
Total (hrs)	**39 Hrs + 24 Hrs = 63 Hrs.**			

English

Subject Name	Code	Type of course	T-P-P	Prerequisite
English	BSFL1101	Theory	2-0-0	Nil

Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class
External Examination	End Semester University Examination	60	Written examination
Total		100	

Course Outlines

Module-I: Communication Skill Communication:

Definition, concept Channels of Communication: Sender, receiver, channel, message, encoding, decoding, context, feedback Verbal & Non-Verbal Communication: Spoken & written-advantages & disadvantages, Bias free English, Formal & informal style.

Module-II: Communicative Grammar :

Time, Tense & Aspect Verbs of state & events Modality Active & Passive voice Antonyms, Synonyms, Homonyms, one word substitutions & correction of errors

Module-III: Sounds of English:

 Length of vowels: Long vowels as in the words feel, food, shoot, card etc. Short vowels as in the words pen, sun, cut, shut, etc. Consonants Stress pattern Intonation: Rising & Falling.

Text Books: Effective technical communication by M.A.Rizvi

Reference Books:

1. Communicative English & Business Communication by R.K.Panda, J.Khuntia, M.Pati, Alok Publication.

2. Communicative Grammar of English GeofferyLeech

Database Management Systems

Subject Name	Code	Type of course	T-P-P	Prerequisite
Database management Systems	BCTI 1202	Cloud Infrastructure Solutions	4-2-0	Nil

Objective

To introduce the fundamental concepts of database systems and their importance in practical life.To introduce the basic concepts necessary for designing, using, and implementing database systems and applications.To make the students understand the principles behind relational database management systems including the database environment, the relational model, relational languages (SQL). Tomake students able to develop simple SQLqueries.

Learning outcome

On successful completion of this course, students will be able to: Understand, appreciate and effectively explain the underlying concepts of database technologies .Solve simple database problems related to manipulating data present in the database by writing SQL Queries. Design and implement a relational model for a given problem domain.

Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam.	20	Lab work, report and viva
Total		100	

1. Course outline

Module I   **(10 Lectures)**

The Database and DBMS Architecture

Introduction to Database Management Systems: Characteristics of database approach, data models,DBMS architecture and data independence.

Module II: **(15Lectures)**

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99:Schema Definition ,constraints, and object modeling.

Module III   **(15 Lectures)**

Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries. Database design: ER and EER to relational mapping, functional dependencies, normal forms up to third normalform.

Database Management Systems Lab

Note: My Access/MySQL may be used.

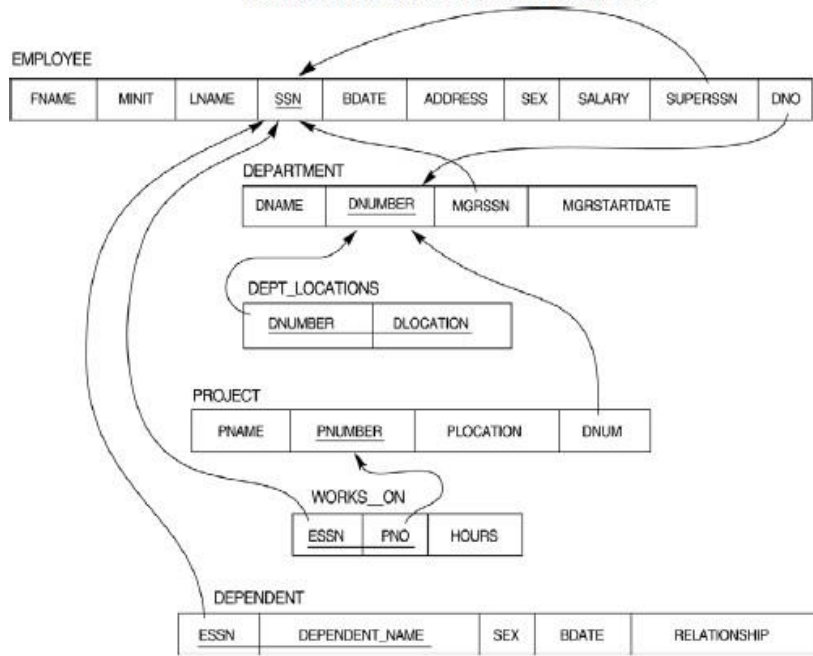The following concepts must be introduced to the students:
DDL Commands

• Create table, alter table, droptable

DML Commands

• Select , update, delete, insertstatements

• Condition specification using Boolean and comparison operators (and,or,

not,=,<>,>,<,>=,<=)

• Arithmetic operators and aggregate functions(Count, sum, avg, Min,Max)

• Multiple table queries (join on different and sametables)

• Nested selectstatements

• Set manipulation using (any, in, contains, all, not in, not contains, exists,not

exists, union, intersect, minus, etc.)

• Categorization using groupby……..having

• Arranging using orderby

Relational Database Schema - COMPANY

EMPLOYEE

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO

DEPARTMENT

DNAME	DNUMBER	MGRSSN	MGRSTARTDATE

DEPT_LOCATIONS

DNUMBER	DLOCATION

PROJECT

PNAME	PNUMBER	PLOCATION	DNUM

WORKS__ON

ESSN	PNO	HOURS

DEPENDENT

ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP

Questions to be performed on above schema

1. Create tables with relevant foreign key constraints

2. Populate the tables with data

3. Perform the following queries on the database:

4. Display all the details of all employees working in the company

5. Display ssn, lname, fname, address of employees who work in department no7

6. Retrieve the birthdate and address of the employee whose name is 'Franklin T.Wong'

7. Retrieve the name and salary of every employee

8. Retrieve all distinct salary values

9. Retrieve all employee names whose address is in „Bellaire"

10. Retrieve all employees who were born during the1950s

11. Retrieve all employees in department 5 whose salary is between 50,000and

12. 60,000(inclusive)

13. Retrieve the names of all employees who do not have supervisors

14. Retrieve SSN and department name for all employees

15. Retrieve the name and address of all employees who work for the 'Research 'department

16. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.

17. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.

18. Retrieve all combinations of Employee Name and Department Name

19. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan"eitherasa workerorasamanagerofthedepartment that controls the project.

20. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.

21. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.

22. Select the names of employees whose salary does not match with salary of any employee indepartment10.

23. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.

24. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, orStafford.

25. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.

26. Find the sum of the salaries and number of employees of all employees of the „Marketing" department, as well as the maximum salary, the minimum salary, and the average salary in this department.

27. Select the names of employees whose salary is greater than the average salary of all employees in department10.

28. For each department, retrieve the department number, the number of employees in the department, and their average salary.

29. For each project, retrieve the project number, the project name, and the number of employees who work on that project.

30. Change the location and controlling department number for all projects having more than 5 employeesto „Bellaire"and 6 respectively.

31. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.

32. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.

33. Delete all dependents of employee whose ssnis„123456789‟.

34. Delete an employee from Employee table with ssn= „12345‟(make sure that this employee hassome dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set toNULL

35. Perform a query using alter command to drop/add field and a constraint in Employeetable.

5. **Reference**

E-content: www.krackin.com

Text Books:

1.R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

Reference Books :

1.R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.

2.A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

3.R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013

6. **Session Plan**

Topic coverage and Internal Test	No. of Sessions(in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Introduction to Database Management Systems: Characteristics of database approach, data models, DBMSarchitecture and data independence.	**10**	**lecture**	**Assignment**	Book, Video, Online source

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99:Schema Definition ,constraints, and object modeling.	15	**lecture**	**Assignment**	Book, Video, Online source
Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries. Database design: ER and EER to relational mapping, functional dependencies, normal forms up to third normal form.	**15**	**lecture**	**Assignment**	Book, Video, Online source
Total (hrs)	40			

Object Oriented Programming using JAVA

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Object Oriented Programming using JAVA	BCTI 1205	Theory+ Practice	4-2-0	Nil

1. Objective

- Understand Object Oriented Principles
- Understand variables and operators
- Understand control statements to control the flow of program executions
- Understand inheritance and polymorphism
- Understand lambda expressions to minimize program code
- Understand files and its operations
- Understand threads and thread programming
- Understand networking and information sharing
- Understand GUI programing and AWT Package

2. Learning outcome

- Write Java program to implement classes and objects
- Write Java program to implement inheritance
- Write Java program to handle exceptions
- Write Java program to manipulate files
- Write Java program to implement multiple threads

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam.	20	Lab work, report and viva
Total		100	

Course outline

Module-I : Introduction   (10 hrs)

Theory

History, Overview of Java, Object Oriented Programming, A simple Programme, 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.

Practice

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 display a multiplication table.
4. Write a program to display all prime numbers between 1 to 1t000.

Module-II: Classes   (5 hrs)

Theory

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.

Practice

5. Write a program to insert element in existing array.
6. Write a program to sort existing array.
7. Write a program to execute any Windows 95 application (Like notepad, calculator etc)

Module-III: Classes   (5 hrs)

Theory

Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance.

Practice

8. Write a program to find the sum of digits of a given number.
9. Write a program to check all math class functions
10. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Module-IV: Packages (7 hrs)

Theory

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.

Practice

11. Write a program to copy a file to another file using Java to package classes. Get the file names at runtime and if the target file is existed then ask confirmation to overwrite and take necessary actions.
12. Write programs on exception handling with try, catch, throw, throws, finally statements.

Module-V: Multithreaded Programming (5 hrs)

Theory

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,

Practice

13. Write a program to get file name at runtime and display number f lines and words in that file.
14. WAP to solve producer consumer problem.
15. WAP for simple moving banner.

Module-VI: AWT (5 hrs)

Theory

Applet Fundamentals, the AWT package, AWT Event handling concepts The transient and volatile modifiers, Collection Framework

Practice

16. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels
17. Write a program on List and Set.

Module-VII: JAVA Database Connectivity (JDBC) (4 hrs)

Theory

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.

Practice

18. WAP on JDBC application to query a database.

Reference

E-content: www.krackin.com

Text 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.

Online Source: Oracle.com The Java Tutorials

Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity	Assignment	Suggested Reading
Module-I [10hrs. Lecture + 6hrs. Practice]				
History, Overview of Java, Object Oriented Programming, A simple Programme, Two control statements - if statement, for loop, using Blocks of codes	2	lecture	assignment	Book, Online source
Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words	2	lecture	assignment	Book, Online source
Data types: Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays	2	lecture	Assignments, experiments	Book, Online source
Operators: Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence	2	lecture	Assignments, experiments	Book, Online source
Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements	2	Lecture,	Assignment, experiments	Book, Online source

Write a program to check whether two strings are equal or not. Write a program to display reverse string. Write a program to display a multiplication table. Write a program to display all prime numbers between 1 to 1000.	6	lab practice	Assignments, experiments	
Module-II [5hrs. Lecture + 4hrs. Practice]				
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	3	Lecture,	Assignment, experiments	Book, Online source
Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments.	2	Lecture,	Assignment, experiments	Book, Online source
Write a program to insert element in existing array. Write a program to sort existing array. Write a program to execute any Windows 95 application (Like notepad, calculator etc)	4	lab practice	Assignment, experiments	
Module-III [5hrs. Lecture + 4hrs. Practice]				
Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance	5	Lecture,	Assignment, experiments	Book, Online source

Write a program to find the sum of digits of a given number. Write a program to check all math class functions Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).	4	lab practice	Assignment, experiments	
Module-IV [7hrs. Lecture + 4hrs. Practice]				
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	3	Lecture	assignments	Book, Online source
Exception Handling: Fundamental, Exception types, Using try and catch, Multiple catch clauses	4	Lecture	assignments	Book, Online source
Nested try Statements, throw, throws, finally, Java's Built - in exception, using Exceptions	2	Lecture,	Assignments, experiments	Book, Online source
Write a program to copy a file to another file using Java to package classes. Get the file names at runtime and if the target file is existed then ask confirmation to overwrite and take necessary actions. Write programs on exception handling with try, catch, throw, throws, finally statements.	4	lab practice	Assignments, experiments	

Module-V [4hrs. Lecture + 6hrs. Practice]				
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. I/O basics, Reading control input, writing control output, Reading and Writing files,	4	Lecture,	Assignments, experiments	Book, Online source
Write a program to get file name at runtime and display number f lines and words in that file. WAP to solve producer consumer problem.	6	lab practice	Assignments, experiments	
Module-VI [4hrs. Lecture + 6hrs. Practice]				
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	4	Lecture	Assignments, experiments	Book, Online source
Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels Write a program on List and Set.	6	lab practice	Assignments, experiments	
Module-VII [4hrs. Lecture + 2hrs. Practice]				
Database connectivity: JDBC architecture, JDBC Drivers, the JDBC API: loading a driver, connecting to a database	2	Lecture	assignments	Book, Online source

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	2	Lecture,	Assignments,	Book, Online source
WAP on JDBC application to query a database.	2	lab practice	experiments	
Total (hrs.)	**73**	**41 hrs. Lecture + 32 hrs. Practice**		

Lab Experiments

1. Write a Java Program to store n numbers in an array and print prime number from that array.

2. Write a Java Program to manipulate array numbers with operations (Adding, Deleting, Updating) using exception handling (Using Nested try catch and finally).

3. Write a program to implement Package with classes (Use previously created class) and import them into another program

4. Write a JAVA program which has

   I. A Class called Account that creates account with 500Rs minimum balance ,a deposit() method to deposit amount, a withdraw() method to withdraw amount and also throws LessBalanceException if an account holder tries to withdraw money which makes the balance become less than 500Rs.

   II. A Class called LessBalanceException which returns the statement that says withdrawamount (___Rs) is not valid.

   III. A Class which creates 2 accounts, both accountdepositmoney and one account tries to with draw more money which generates a LessBalanceException take appropriate action for the same.

5. Write a Java Program to print digital clock using Threads and Exceptions

6. Write a JAVA Program to implement console chat application suing Sockets

7. Write a JAVA Program to access remote data from a database using RMI.

8 .Write a JAVA Program to read and write data to and from a file.

9. Write a JAVA program which uses Datagram Socket for Client Server Communication.

10. Implement GUI Simple Calculator suing AWT and Action Listeners

11. Implement GUI Chat Application using Swing and Sockets

Operating System

Subject Name	Code	Type of course	T-P-P	Prerequisite
Operating System	BCTI 1106	Theory & Lab	4-2-0	Nil

1. Objective

- The main goal of studying operating system is to get an overview of the concepts of operating system, its capabilities and limitations.

- It will also give an overview on how to manage tasks at the same time.

2. Learning outcome

- Students will be able to learn about various concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, disk management and security.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

<div align="center">**Course Outline**</div>

Module: I
Introduction: (8hrs)
Architecture, Goals & Structures of O.S, Basic functions, Interaction of O. S. & hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed & real -time O.S.

Module: II
Process Management: (13hrs)
Process Concept, Process states, Process control, Threads, Uni- processor Scheduling: Types of scheduling : Preemptive, Non preemptive, Scheduling algorithms : FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait.

Module: III(12hrs)
Concurrency control :
Concurrency : Principles of Concurrency, Mutual Exclusion : S/W approaches, H/W Support, Semaphores, pipes, Message Passing, signals, Monitors, Classical Problems of Synchronization : Readers-Writers, Producer Consumer, and Dining Philosopher problem. Deadlock :Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls like signal,kill.

Module : IV
Memory Management : (12hrs)
Memory Management requirements, Memory partitioning : Fixed and Variable Partitioning, Memory Allocation : Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging

Module V
Virtual Memory : (8hrs)
Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.

Module : VI
I/O management & Disk scheduling : (8hrs)
 I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.

Module : VII
Inter Process Communication :(10hrs)
Basic Concepts of Concurrency, Cooperating process, Advantage of Cooperating process, Bounded-Buffer - Shared-Memory Solution, Inter- process Communication (IPC), Basic Concepts of Inter-process Communication and Synchronization.

Text Book:
 Operating System Conceptsby Abraham Silberschatz , Peter B. Galvin , Wiley Publication

Information and Network Security

Subject Name	Code	Type of course	T-P-P	Prerequisite
Information and Network Security	BCTI 2308	Theory + Practice	4-2-0	Nil

1. Objective

- To help students to understand the foundational concepts of information security and to make it possible for students to appreciate the need for securing information from threats and risks.
- Similarly, to facilitate students, gain hands-on experience of identifying and providing solutions for common network security challenges using various security tools and techniques.

- Moreover, to understand various types of algorithms and processes used in cryptography and how they are applied in achieving the goals of cryptography such as confidentiality, integrity and authentication

2. Learning outcome

- Explain the concepts of IT security, Threats, Vulnerabilities, Impact and control measures.
- Illustrate asset management along with the objective to create awareness in Digital Rights Management.
- Apply their understanding of network security in identifying common issues and propose suitable solutions
- Implement various algorithms and processes used in cryptography for authenticating users, securing information and communication

- Design and implement the security policies and access controls in an organization

Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

3. Course Outline

Module I: Introduction to Information Security (9 Hrs.)

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 II: Network Security (4 Hrs.)

Network Security

Basic concept of network security: Computer security, Network security, Trusted and untrusted networks, unknown attack, network attack. Securing computer network: Hardware, Software.Forms of protection.

Module III: VPN Security (5Hrs)

VPN Security: need of VPN, role of VPN for an enterprise, use of tunnelling with VPN, working with VPN, authentication mechanism in VPN, types of VPN and their usage Network Security Issues and Vulnerabilities, Security best practices.

Module IV: Network Security Controls (9 Hrs.)

Network Security Controls

Network attacks, Need for intrusion monitoring and detection, intrusion detection for information system security: intrusion detection methodologies, categories of IDS, characteristics of IDS, role of router in IDS, challenges for IDS, implementing IDS, future of IDS. Examining firewall in the context of IDS, Network Intrusion Prevention, IPS signature categories, IPS system configuration.

Module V: Introduction to Cryptography (4 Hrs.)

Introduction to Cryptography

Introduction to Cryptography and Cryptanalysis, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Permutation Method.

Module VI Advanced Encryption Techniques and Security Issues (5 Hrs)

Advanced Encryption Techniques and Security Issues

Advanced Encryption Techniques and Security Issues – RC4, One-time Pad, RSA, DES, Triple DES, AES and Diffie Hellman,.

Module VII: Cryptography Key Management (9 Hrs)

Cryptography Key Management

Key Distribution and management ISAKMP, Digital Signature, Use and functions of Certifying Authorities (CAs),Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions, Vulnerabilities to cryptographic functions..

Information and Network Security LABS

List of Experiment:

1. System Security Configuration in Windows7
2. Password based Authentication process
3. Hashes and message digests calculation using hascalculators
4. Service Management of Windows 7 for prevention of attacks
5. Password cracking using Brute force, Dictionary and Rainbow attack
6. Hiding information using Steganography tools
7. Event logger analysis
8. Windows Registry analysis
9. Firewall Configuration
10. VPN Configuration
11. IDS Configuration
12. Router Security
13. Traffic Monitoring using WireShark

4. E-content: LMS

Text Books:

1. Cryptography and Network Security by AtulKahate, McGraw Hill India, 3rded; July 2017

2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008.

3. Cryptography and Network Security by S. Bose, Pearson India, 1sted; Mar 2016

Reference Books:

1. Information Security Risk Analysis- Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012.

2. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013).

3. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 editions (2015).

4. Cryptography and Network Security Principles and Practices, by William Stallings, Pearson Education; Seventh edition (30 June 2017).

5. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009).

Online Source:

https://lo.unisa.edu.au/mod/book/view.php?id=743436&chapterid=117759

https://www.apprendre-en-ligne.net/crypto/bibliotheque/PDF/Kwang.pdf

https://thebestvpn.com/what-is-vpn-beginners-guide/

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I Introduction to Information Security(9 Hrs.)				
Introduction to Information Security Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security;	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS
Components of the Information System; Balancing Information Security and Access; Implementing IT Security,	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS
The System Development Life cycle, Security professional in the organisation.	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS

Module-II **Network Security** (6 Hrs.)					
Network Security Basic concept of network security: Computer security, Network security,	2+2	Lecture+Practice	Assignment	Book, Online Source,LMS	
Module-IIIVPN Security (3 Hrs.)					
VPN Security: need of VPN, role of VPN for an enterprise, use of tunnelling with VPN, working with VPN,	2+2	Lecture+Practice	Assignment	Book, Online Source,LMS	
authentication mechanism in VPN, types of VPN and their usage Network.					
Security Issues and Vulnerabilities, Security best practices	1+1	Lecture+Practice	Assignment	Book, Online Source,LMS	
Module-IVNetwork Security Controls (9 Hrs.)					
Network Security Controls Network attacks, Need for intrusion monitoring and detection, intrusion detection for information system	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS	
security: intrusion detection methodologies, categories of IDS, characteristics of IDS, role of router in IDS, challenges for IDS, implementing IDS,	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS	

future of IDS.				
Examining firewall in the context of IDS, Network Intrusion Prevention, IPS signature categories, IPS system configuration.	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS
Module-V Introduction to Cryptography (4 Hrs.)				
Introduction to Cryptography Introduction to Cryptography and Cryptanalysis,	2+2	Lecture+Practice	Assignment	Book, Online Source,LMS
Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Permutation Method.	2+2	Lecture+Practice	Assignment	Book, Online Source,LMS
Module-VI Advanced Encryption Techniques and Security Issues (5 Hrs.)				
Advanced Encryption Techniques and Security Issues Advanced Encryption Techniques and Security Issues – RC4, One-time Pad, RSA	2+2	Lecture+Practice	Assignment	Book, Online Source,LMS
DES, Triple DES, AES	2+2	Lecture+Practice	Assignment	Book, Online Source,LMS
Diffie Hellman,.	1+1	Lecture+Practice	Assignment	Book, Online Source,LMS
Module-VII Cryptography Key Management (9 Hrs.)				

Cryptography Key Management Key Distribution and management ISAKMP, Digital Signature, Use and functions of Certifying Authorities (CAs),	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS
Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions,	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS
Vulnerabilities to cryptographic functions	3+3	Lecture+Practice	Assignment	Book, Online Source,LMS
Total (hrs)	**90 Hrs.**			

Principles of Virtualization

Subject Name	Code	Type of course	T-P-P	Prerequisite
Principles of Virtualization	BCTI 2302	Theory & Lab	4-2-0	Nil

1. 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 VM Ware Virtualization, its installation process and the working of Windows Server hyper V.

2. Learning 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.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam.	20	Lab work, report and viva
Total		100	

1. Course outline

Module I Basics of Virtualization: (10 Hrs)

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 II

Deploying and Managing an Enterprise Desktop Virtualization Environment (9 Hrs)

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 maintainimages.

Module III Deploying and Managing a Presentation Virtualization Environment (6 Hrs)

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

Module IV Accessing published applications (6 Hrs)

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

Module V Understanding Virtualization Software1 (8 Hrs)

List of virtualization Software available.Vmware- introduction to Vsphere, ESXi, VCenter Server and Vsphere client.Creating Virtual Machine.

Module VI Understanding Virtualization Software2 (4 Hrs)

Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots.

Module VII Understanding Virtualization Software3 (4 Hrs)

Monitor the performance of a Hyper-v server, Citrix XEN Desktop fundamentals

PRINCIPLES OF VIRTUALIZATION LAB

List of Programs:

1. Installing VMware ESXiserver.

2. Accessing ESXi through vSphere Client and Uploading ISO Images of OS into the Datastore of ESXiServer.

3. Creating Virtual machines in the ESXiServer

4. Monitoring the performance of ESXiServer.

5. Preparing Domain for vCenter Server asprerequisite.

6. Installing vCenterServer

7. Creating Datacenter and adding ESXi Server as Host to vCenterServer.

8. Cloning a Virtual Machine and Creating a Virtual Machine from cloned VMTemplate.

9. Configuring vNetwork Distributed Switch using vCenterServer.

10. Assigning permissions to users onDatacenter.

6. **Reference**

E-content:

www.krackin.com Text

Books:

1. Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner,Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten SeldamSyngress Publications,2006

Reference Books:

1. Virtualization--the complete cornerstone guide to virtualization best practices by Ivanka Menken, Gerard Blokdijk- Lightning Source Incorporated,2008

2. Virtualization: From the Desktop to the Enterprise By Chris Wolf, Erick M. HalterEBook, 2005

Online Source: vmware Academy

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)

Basics of Virtualization: Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization.	4	**Lecture**	**assignment**	**Video, book**
Network Virtualization, Client Virtualization, Application Virtualization, Desktop Virtualization	3	Lecture		
Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments. Helping with Disaster Recovery.	3			
Deploying and Managing an Enterprise Desktop	5 Lecture	5 Lab		
Virtualization Environment : Configure the BIOS to support hardware virtualization; Installand 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.	4 Lecture	5 Lab		
Deploying and Managing a Presentation Virtualization Environment: Prepare and manage remote applications: configuring application sharing, package applications for deployment by using Remote App.	4 Lecture	5 Lab		
Installing and configuring the RD Session Host Role Service on the server.	4 Lecture	5 Lab		
Accessing published applications: Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, and configuring Remote Desktop client connections	3 Lecture	3 Lab		
Configure client settings to access virtualized desktops: configuring client settings	3 Lecture	5 Lab		

Understanding Virtualization Software: List of virtualization Software available. Vmware- introduction to Vsphere, ESXi, VCenter Server and Vsphere client. Creating Virtual Machine.	8 Lecture	5 Lab		
Understanding Virtualization Software2: Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots.	4 Lecture	2 Lab		
Understanding VirtualizationSoftware3: Monitor the performance of a Hyper-v server, Citrix XEN Desktop fundamentals	4 lecture	2 Lab		
Total (hrs)	49	37		

IT Governance, Risk and Information Security Management

Subject Name	Code	Type of course	T-P-P	Prerequisite
IT Governance, Risk and Information Security Management	BCTI2305	Theory	2-0-0	Nil

1. Objective

- Understand the importance of Information Technology governance in business Perspective.

- Explain different frameworks of ISACA like COBIT, Val IT and Risk IT.

- Illustrate Information Security Management system.

2. Learning outcome

- Explain the role of governance in information security.

- Interpret ISACA frameworks like COBIT, Risk IT and ValIT.

- Discuss information security management system; Outline the benefits of performance optimization.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Sem University Examination	60	Written examination
Total		100	

4. Course outline

MODULE-I   (8Lectures)

IT Governance-Part 1

Introduction & Concepts, Origin of Governance, Corporate Governance, Best Practices for IT Governance, Role of Governance inInformation Security, Six outcomes of effective Security Governance, benefits of good governance, Cultural aspects in governance.

MODULE-II

IT Governance-Part2

IT Governance- Roles and Responsibilities, Role of IT Strategy Committee and Security Steering Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA,

MODULE-III

Governance in multi- department and multi-country enterprises, Importance of Governance in establishing a sustainable Security Culture in the organization.

MODULE-IV   (12 Lectures)

Information Systems Strategy:

Role of Strategic Planning for IT, Strategic Direction and Alignment of Security Strategy with Business Objectives, Role of CISO, Security Metrics Program**.**

MODULE-V

Risk Management Program:

Develop a Risk Management Program. Risk Management Process, Roles and Responsibilities, Risk-IT Framework of ISACA, Strategic Security decision using Risk Management.

MODULE-VI   (8 Lectures)

Information Security Management:

Introduction, Performance Optimization, Management Information Security Forum, Segregation of Duties, Description of COBIT and other Frameworks,

MODULE-VII

Security Program Effectiveness, Continuous Assessment and Improvement, In-sourcing versus Out-sourcing, Impact of ISM program across organization.

5. Reference

E-content:

www.krackin.com Text

Books:

1. Information Security Governance by S.H. Solms, RossouwSolms, Springer; 1st Edition. 2nd Printing, 2008 edition (12 December2008)

2. IT Governance: How Top Performers Manage IT Decision Rights for Superior Resultsby Weill, Harvard Business Review Press; First edition (1 June2004)

3. ISACA publications

Reference Books:

1. Managing Risk and Information Security by Malcolm Harkins, Apress; 1 edition,2012

2. IT Governance: An International Guide to Data Security and ISO27001/ISO27002 byAlan Calder, Steve Watkins, Kogan Page; 6 edition (3 September2015)

3. ISACA publications on COBIT, RiskIT andValIT

4. Information Security Governance: Guidance for Information Security Managers by W.KragBrotby and IT Governance Institute, Isaca (2 June2008)

5. COBIT 5 Framework Perfect by Isaca, (10 April2012)

6. Cobit 5 Foundation-reference and Study Guide by Ana Cecilia Delgado, CreateSpace Independent Publishing Platform; Stg edition (20 June2016)

OnlineSource: www.isaca.org

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Introduction & Concepts, Origin of Governance, Corporate Governance, Best Practices for IT Governance, Role of Governance in Information Security, Six outcomes of effective Security Governance, benefits of good governance, Cultural aspects in governance.	2	Lecture	Assignment	Book, Online Sources
IT Governance- Roles and Responsibilities, Role of IT Strategy Committee and Security Steering Committee	2	Lecture	Assignment	Book, Online Sources
Standard IT Balanced Scorecard. Val-IT framework ofISACA	2	Lecture	Assignment	Book, Online Sources
Governance inmulti-department and multi-country enterprises, Importance of Governance in establishing a sustainable Security	2	Lecture	Assignment	Book, Online Sources

Role of Strategic Planning for IT, Strategic Direction and Alignment of Security Strategy with Business Objectives	2	Lecture	Assignment	Book, Online Sources
Role of CISO, Security Metrics Program	4	Lecture	Assignment	Book, Online Sources
Develop a Risk Management Program. Risk Management Process, Roles and Responsibilities	2	Lecture	Assignment	Book, Online Sources
Risk-IT Framework of ISACA, Strategic Security decisioning using Risk Management	4	Lecture	Assignment	Book, Online Sources
Introduction, Performance Optimization, Management Information Security Forum, Segregation ofDuties	2	Lecture	Assignment	Book, Online Sources
Description of COBIT and other Frameworks, Security Program Effectiveness, Continuous Assessment and Improvement	4	Lecture	Assignment	Book, Online Sources
In-sourcing versus Out-sourcing, Impact of ISM program across organization.	2	Lecture	Assignment	Book, Online Sources
Total (hrs)	**28 Hrs**			

Data Structures and Algorithms

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Data Structures and Algorithms	BCTI2306	Theory +Practice	4-2-0	Nil

1. Objective

- Understand and implement linear, nonlinear data structures
- Understand and implement various searching and sorting techniques.

Learning Outcome

- Students will able to implement linear, non-linear data structures.
- Students will able to implement various searching and sorting techniques.

Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Class Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

2. Course Outline

Module I   **(Total 4Hrs)**

Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing.

Module II   **(Total6Hrs)**

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 III   **(Total 6Hrs)**

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, Quicksort

Module IV   **(Total 8hrs)**

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 V   **(Total 6Hrs)**

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 VI   **(Total 5Hrs)**

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

Module VII   **(Total 3Hrs)**

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

3. Reference

E-content: LMS

Text Books:

Books:

1. Lipschutz: Schaum's outline series Data structures with C Tata McGraw-Hill Indian Edition 2011
2. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001.

Reference Books:

1. Tenenbaum, Data Structures Using C. Pearson Education, Seventh Impression, 2009

2. Kamthane: Introduction to Data Structures in C. Pearson Education . Third Impression, 2009

Online Source:

1. http://nptel.ac.in/courses/Webcourse-contents/IIT- %20Guwahati/data_str_algo/frameset.htm

2. https://www.cs.utexas.edu/users/djimenez/utsa/cs1723/lecture2.html

4. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module I: (Total 4Hrs.+2Hrs.)				
Definition, Classification of data structures: primitive and non primitive, Elementary data	4+2	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM
Module II: (Total 6Hrs.+4Hrs)				

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 malloc(), calloc(), free() andrealloc(). Recursion: Definition, Recursion in C (advantages), writing recursive programs – Binomial coefficient, Fibonacci, GCD	6+4	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM

Module III: (Total 6Hrs.+6Hrs.)

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive method s, Comparison between	6+6	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM
sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quicksort				

Module IV: (Total 8Hrs.+6Hrs.)

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	8+6	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM

Module V: (Total 6Hrs.+4Hrs.)

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.	6+4	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM

Module VI: (Total 5Hrs.+6Hrs)

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node,Degreeofanodeand tree, Terminal nodes,Non-	5+6	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM

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,				
Module VII: (Total 3Hrs.+2Hrs.)				
Graphs, Application of Graphs, Depth First search, Breadth First search.	3+2	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM
Total (hrs)	38+30			

Introduction to Web Technology

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Introduction to Web Technology	BCTI 2307	Theory +Practice	4-2-0	Nil

1. Objective

- This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web and general grounding introduction to more advanced topics such as programming scripting. This will also explore expose students to the basic tools and applications used in Web publishing.

2. Learning outcome

Students may also create web pages using XHTML and Cascading Style Sheets. Build dynamic web pages using JavaScript (Client side programming).

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

Module I (5 hrs)

What is Web? What is WWW, Web site - Static and Dynamic web site, Web application - Client-server, Web development Technologies- Html, CSS, Js, XML, Servlet & JSP, PHP and Ajax.

Module II (7 hrs)

Introduction to Html, Html structure, Html Editors, Html element/tag & attributes,Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div. tag, Html forms - Input type, Text area, Select,Button.

Module III (5 hrs)

Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background color, Borders & boxing

Module IV (6 hrs)

Introduction to JS, Embedding JS into Html, Variables, Data types, Operators, Conditional statements, Looping statements, Strings, Arrays, Math Object, Date Object, Functions, Objects, Event Handling.

Module V (3 hrs)

Introduction to XML, Difference b/w Html & XML, XML editors

Module VI (3 hrs)

XML Elements & Attributes XML DTD, XML Schema

Modle VII (4 hrs)

XML Schema, XML DOM
E-content: LMS Content
Reference Books:

1. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White,Bill Karow- Wiley Publishing Inc, 2010.

2. HTML Black Book by Steven Holzner2011

3. Web Design with HTML, CSS, JavaScript and jQuerySetby JonDuckett.

4. Beginning Java Script with DOM scripting and Ajax By Christian Heilmann- Apress Publisher,2010.

5. Learning PHP & My SQL, Michele Davis, Jon Philips- O'Reilly Publisher,2009.

6. PHP Cook book By: David Sklar, Adam Trachtenberg- O'Reilly Publisher,2008

Introduction to Web Technology Lab List of Programs:

1. Create a simple web page usingHTML

2. Create and HTML page with a table and a set of ordered and unordered list.

3. Use CSS in the above webpage

4. Design a web page for a companyXYZ

5. Develop a static web page that shows basic animation

6. Develop a web page for an audio company

7. Develop a dynamic webpage

8. Develop a dynamic web page using DHTML andCSS

9. Consider a company ABC which is into selling movie CDs. Develop a web page for the company.

10. Create a web site in which you can navigate from one page to another

11. Create a dynamic web page for a college

12. Organize a set of data usingXML

4. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I (Total Theory = 5 Hours)				
What is Web?, What is WWW, Web site - Static and Dynamic web site,	2	Class Room Teaching+ PPT	Assignment	Book,OnlineSources,SLM
Web application - Client- server, Web development Technologies-Html, CSS, Js, XML, Servlet & JSP, PHP and Ajax.	3	Class Room Teaching+ PPT	Assignment	Book,OnlineSources,SLM
Module II (Total Theory = 7 Hour /Practical= 8 Hour)				
Introduction to Html, Html structure, Html, Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table	3+4	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM

tag, List tag				
Frame tag, Divtag ; Html forms - Input type, Text area, Select , Button.	3+4	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM

Module III (Total Theory = 5 Hours / Practical= 7 Hours)

Introduction to CSS, Syntax, Selectors	2+3	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM
Embedding CSS to Html, Formatting fonts, Text & background colour, Borders & boxing.	3+4	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM

Module-IV (Total Theory= 6 hour / Practical = 7 Hour)

Introduction to JS, Embedding JS into Html, Variables, Data types		Class Room Teaching+	Assignment	Book,OnlineSources,SLM

	2	PPT+Practical		
Operators, Conditional statements, Looping statements, Strings,	2+5	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM

Arrays, Math Object,Date Object, Functions,Objects				
Event Handling	2+2	Class Room Teaching+ PPT	Assignment	Book,OnlineSources,SLM

Module-V (Total Theory= 3 Hour/ Practical = 1 Hour)

Introduction to XML, Difference b/w Html & XML	3+1	Lecture	Assignment	Book,OnlineSources,SLM

Module-VI (Total Theory= 3 Hour/ Practical = 1 Hour)

XML editors, XML Elements. XML Schema	3+1	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM

Module-VII (Total Theory= 4 Hour/ Practical = 0 Hour)

XML Schema, XML DOM	4	Class Room Teaching+ PPT+Practical	Assignment	Book,OnlineSources,SLM
Total (hrs)	Total = 57 Hours (Theory 33 Hours + Practical 24 Hours)			

Linux Administration

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Linux Administration	BCTI2406	Theory +Practice	4-2-0	Operating System

1. 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.

2. Learning outcome

- Student will understand about the basic of Linux, its File System and Process Management.

- Student will learn to write Server management.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Class Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

Course outline

Unit I: Introduction to Linux

Introduction to Operating system - Types of Operating system - Multi user operating system - Open source licensing - History of Linux - Unix Vs Linux - Flavors of Linux - Benefits and characteristics of Linux - Installation of Linux - Linux booting process - Log in and switch users in multiuser run levels - Shell and bash features - Linux kernel - sudovssu - Date and time configuration – Linux run levels.

Directories and files:

Directory structure - System directory - Absolute path and relative path -Creating and removing directory - Changing directory path - Creating - removing - copying and moving files - File Permissions - Links – hard link and soft link - Input and output redirection - Filters and pipes - Locate - read - and use system documentation including man page

Unit II: Package, User and group Management

RPM - YUM - Archive - Compress - unpack and uncompress files using tar - star - gzip - and bzip2 - Create - delete - and modify local user accounts - Change passwords for local user accounts - Create - delete - and modify local groups and group memberships - Changing owner and modes.

Unit III: Configuring local storage and filesystem

List - create - delete - and partition type for primary - extended - and logical partitions - Create and remove physical volumes - assign physical volumes to volume groups - Create and delete logical Volumes. - Create - mount - unmount - ext2 - ext3 - and ext4 file systems. - Mount - unmount - and LUKS-encrypted file systems - Access control list.

Unit IV: Managing system and infrastructure services:

Managing system services - Shutting down - suspending and hibernating the system - Controlling systemd on remote machine - Creating and modifying systemd unit files – DHCP Configuration - HTTP server Configuration –

Unit V: Server Configuration:

FTP server Configuration - Mail server Configuration - Samba server Configuration - NTP server Configuration - NFS server Configuration

Unit VI: OpenSSH:

OPENSSH - The SSH Protocol - Configuring OpenSSH and Starting an OpenSSH Server Key-Based Authentication in OpenSSH - OpenSSH Clients - Using the ssh Utility - scp Utility and sftp Utility -

Unit VII: Linux security

Configure firewall settings using system-config-firewall or iptables - Set enforcing and permissive modes for SELinux - List and identify SELinux file and process context.

Text Books:

1. Orsaria, Jang, "RHCSA/RHCE Red Hat Linux Certification Study Guide Exams EX200 & EX300", McGraw-Hill Education, July 2017.

Reference Book:
1. Sander Van Vugt, "Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 (EX200 and EX300)", Phi Learning Pvt Ltd, 2009.

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.

Linux Administration Lab

List of Experiments:

1. Configure the following tasks & verify it. (Hint - use grep/cut/tr/sed)

- List the lines containing "/sbin/nologin" from the /etc/passwd file.

- List only lines of output from ps, which lists running processes that contain the string "init".

- Display the list of GIDs from /etc/passwd file.

- Alter all the letters that starts from range "a-f" to "A-F" in /etc/passwd file.

2. Create an alias named eth0:0 using below credentials in RHEL 5 and verify it.

3. (a) IP ADRESS = 172.16.0.1   (b) 255.255.0.0

   (c) Default Gateway = 172.16.0.254   (d) DNS 1 = 4.2.2.1

4. Configure password policy for user john with below arguments in RHEL 5. After configuration verify the policy applied.

5.

- Minimum password age = 4 days

- Maximum password age = 15 days

- Inactive days = 2 days

- Account Expiration date = 6 months from today

6. Configure the following tasks:

- Add user accounts to your system: Joshua, alex, dax, bryan, zak, ed and manager. Assign each user this password: 123@iMs.

- Add the groups to your system: sales with GID: 1000, HR with GID: 1100 and web with GID: 1200.

- Add Joshua and alex to the sales group, dax and bryan to the HR group, zak and ed to the web group and add manager to all of these groups.

- Login with each user & verify using id command that they are in the appropriate groups.

7. Use ACL to accomplish these tasks:

- Create groups named Admin and Web.

- Create users named John and Jimmy.

- Create a new directory named /depts/tech/. Change the permission so that root is the owner and Admin is the group owner.

- Use ACL to give full permission for /depts/tech/ to the Web group.

- Allow John read/execute but not write permission on the /depts/tech/ directory.

- Allow Jimmy full permission on the /depts/tech/ directory.

8. You are tasked with finding all SUID & SGID files under the / directories.

9. Configure your system that boots to run level 3 by default. Configure X server using command in run level 3.

10. Devise a ps command that does the following. (Hint: sort/ps/top)

- List all processes.

- For each process, prints the information which displays the percentage of CPU usage, the process ID & name of the command that created it.

- The output is sorted by the %cpuvalue from highest to lowest

11. Explain the suid, sgid& sticky bit permission with example

12. Customize the Bash prompt as per given tasks (Hint - PS1)

- Display the current value of primary prompt string.

- Changes prompt to print a static string "ITIMS -'".

- Restore the original prompt.

- Insert the bash history prompt special character "\!" between the hostname and dollar-sign.

13. Configure given tasks for package management: (Hint: use rpm command)

- Check whether ftp package is installed or not.

- If it is not installed, install it & verify it.

- Display the configuration files available through this package.

- Be sure that ftp service must be enabled at startup.

14. Use rpm queries to answer the following questions.

- What files are in the "initscripts" package?

- Which installed packages have "gnome" in their names?

- Which RPM provides /etc/inittab?

15. Prepare a cron job that take the backup of /home at 5:00pm on every Saturday.

16. Change your system date to 1:00pm March 1990.

17. Copy /etc/fstab file to /tmp directory as newfstab file. The user owner is Jack and group owner is admin. Give full permission to user owner and read, write permission to group owner. No permission to others.

18. Configure your system such that SELinux must be in enforcing mode and firewall is enables and ssh service is not allowed through your firewall.

19. Configure ftp server such that anonymous can download and upload the data to ftp server. Deny users John and Carel to access the ftp server. Note that your ftp server must be accessible in your private network only. It can't be accessible in another network.

20. Create a RAID level 1 on /dev/md0 device by creating two equal partitions of 100MB size and mount it on /data. The RAID device must be mounted at the time of system startup.

21. Configure LVM in volume group named volgrp by creating 2 partitions of 100MB size and mount it on /exam directory. The initial size of LVM is approximately 40MB and after extending the size of LVM is 80MB.

22. Configure the DHCP server such that your DHCP server will able to provide IP configuration to 65 systems in your network.

23. Configure the station as NFS server such that /share directory is shared & only accessible in your network. This NFS share should be automatically mounted on remote client using autofs. On remote client system, NFS share should be mounted on /data/share directory.

24. Configure stationx.example.com for quota such that when user neo type

- dd if=/dev/zero of=/quota/somefilebs=1024 count=30, he succeed. When he type

- dd if=/dev/zero of=/quota/somefilebs=1024 count=70 he fails

Pedagogy

Sl. No.	Topic	Pedagogy	Th	Pra
	Development of Linux, Linux Distributions. Structure of Linux	CRT + PPT + Lab Practice		
2	Navigating the File Systems, Managing Files, File Permissionand Access, Shell Basics, Shell Advanced Features, File Name Generation. Common UNIX commands		4	3
3	Installing Linux, Configuring Disk Devices, Creating and Managing File Systems, File System Backup, Kickstart		2	3
4	Installation, Linux Boot Loaders, Linux Kernel Management, Managing User Accounts, Understanding File Listing, Ownership and Permission	CRT + PPT	2	6
5	Managing Software using RPM, Connecting to Network, Linux Network Services, Setting up a Printer		3	0
6	Input Redirection, Output Redirection, Error Redirection, Filter, Pipes. Networking in Linux: Network Connectivity,	CRT + PPT + Lab Practice	2	6
7	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.		5	3

8	Introduction to Networking, Networking, Internet Network Services, Dynamic DNS,Electronic Messaging, Apache	CRT + ppt	4	0
9	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		5	3
10	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.		3	3
11	System calls for the file System: Open – Read - Write - Lseek – Close - File creation	CRT + PPT + Lab Practice	2	3
12	Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes		2	3
13.	Dup - Mounting and Un mounting file systems - Link and Un link.		2	3
	Total		39	39

Ethical Hacking Fundamentals

Subject Name	Code	Type of course	T-P-P	Prerequisite
Ethical Hacking Fundamentals	BCTI0402	Theory + Practice	4-2-0	Nil

1. Objective

- To enable students to better understand the Ethical hacking concepts and various phases of hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques.

- To familiarize them with the wide range of attacks in a Networking environment and to enable him/her to prepare a well defined vulnerability reporting procedure along with the

2. Learning outcome

- Learn Introduction to ethical Hacking, Enumeration and System Hacking

- Learn Hacking Methodology with Sniffers, DoS and web Hacking

- Learn Wireless Network Security and Physical Security

- Learn Linux Security and Network Security

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Class Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

4. Course outline

Introduction to Ethical Hacking

Module I   **(7 Lectures)**

Ethical Hacking, why is it necessary, scope and limitations, skills required, phases of ethical hacking, tools and techniques, Black Box, Gray Box and White Box techniques, differences between vulnerability assessment, ethical hacking and penetration testing.

Module II   **(6 Lectures)**

Reverse engineering, Ethical hacking terminology, Exploit, Vulnerability – Zero-day, manual PT, Case Studies on data breaches and cybercrimes involving hacking.

Ethical Hacking through Attacks and Exploits

Module III   **(7 Lectures)**

EH methodology, attacks, exploits, Denial of Service, Sniffers, malware, Session Hijacking and ethical hacking of Web Servers and applications

Module IV   **(9 Lectures)**

Password Cracking, Key Logger, Hash Injection attack, replay and man-in-the-middle attacks, rainbow table attack, distributed network attack, spoofing, phasing, spyware, rootkits, hiding files, counter measures.

Module V   **(12 Lectures)**

Enumeration and scanning, host discovery, type of scanning – TCP SYN, ACK, XMAS &UDP Port scanning, SQL Injection, Social Engineering, Buffer Overflows, Input data validation, physical penetration attacks, Hacking Wireless Networking, Hacking mobile platforms, Windows and Linux Hacking, Evading IDS, Firewalls and Honeypots, DDoS attacks, using meta sploit, countermeasures

Report writing and Mitigation

Module VI   **(9 Lectures)**

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, CVSS scoring for vulnerabilities, rating and prioritization, impact of these in reporting.

Module VII **(6 Lectures)**

Overview of India‟s Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008 – sections 43, 65 and 66, how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries.

ETHICAL HACKING FUNDAMENTALS LAB

List of Programs:

1. Passive Reconnaissance using "Who is" and Onlinetools

2. Active Reconnaissance using "Sampad" and web sitedetails

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

6. **Reference** E-

content: LMS

TextBooks:

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 June2016)

3. 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 April2017)

4. An Ethical Guide To WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August2014)

5. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 2016, 1stEdition.

Reference Books:

1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September2013)

2. Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C.Smalls

Online Source:

http://hack-o-crack.blogspot.in/2010/12/ethical-hacking-terminology.html
https://www.sans.org/reading-room/whitepapers/hackers/shades-ethical-hacking-black-white-gray-1390

http://threesec.com/uncategorized/the-five-stages-of-ethical-hackinghttp://news.hitb.org/content/footprinting-basics-hacking
https://www.owasp.org/index.php/Top_10_2013-Top_10http://www.cybersecurity.my/data/content_files/13/72.pdf

https://www.offensive-security.com/reports/sample-penetration-testing-report.pdf

7. **Session Plan**

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Introduction to Ethical Hacking: Total 13 Hrs +9 Hrs				
Module I				
Ethical Hacking, why is it necessary, scope and limitations, skills required, phases of ethical hacking, tools and techniques,	4	Lecture	Assignment	Book, Video, Online source
Black Box, Gray Box and White Box techniques, differences between vulnerability assessment, ethical hacking and penetration testing	3 +6	Lecture+ practice	Assignment	Book, Video, Online source
Module II				
Reverse engineering, Ethical hacking terminology, Exploit, Vulnerability – Zero-day, manual PT, Case Studies on data breaches and cybercrimes involving hacking.	6+3	Lecture+ practice	Assignment	Book, Video, Online source
Ethical Hacking through Attacks and Exploits : Total 16 Hrs +9 Hrs				
Module III				

EH methodology, attacks, exploits, Denial of Service, Sniffers, malware, Session Hijacking and ethical hacking of Web Servers and applications	7+3	Lecture+ practice	Assignment	Book, Video, Online source

Module IV

Password Cracking, Key Logger, Hash Injection attack, replay and man-in-the-middle attacks, rainbow table attack, distributed network attack, spoofing, phasing, spyware, root kits, hiding files, countermeasures	9+6	Lecture+ practice	Assignment	Book, Video, Online source

Web and Network Hacking: Total 12 Hrs +15Hrs

Module V

Enumeration and scanning, host discovery, type of scanning – TCP SYN, ACK, XMAS &UDP Port scanning, SQL Injection, Social Engineering	4+6	Lecture+ practice	Assignment	Book, Video, Online source
Buffer Overflows, Input data validation, physical penetration attacks, Hacking Wireless Networking, Hacking mobile platforms	4+3	Lecture+ practice	Assignment	Book, Video, Online source
Windows and Linux Hacking, Evading IDS,	4+6	Lecture+ practice	Assignment	Book, Video, Online source

Report writing and Mitigation: Total 9 hrs +6hrs

Module VI				
Introduction to Report Writing & Mitigation, requirements for low level reporting & high-level reporting of Penetration testing results,	4	Lecture	Assignment	Book, Video, Online source
Demonstration of vulnerabilities and mitigation of issues identified including tracking, CVSS scoring for vulnerabilities, rating and prioritization, impact of these in reporting.	5+6	Lecture+ practice	Assignment	Book, Video, Online source
Ethical Hacking and Legal System: Total 6 Hrs				
Overview of India''s Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008– sections 43, 65 and 66,	3	Lecture	Assignment	Book, Video, Online source
how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries.	3	Lecture	Assignment	Book, Video, Online source
Total (hrs)	**56+39 Hrs**			

Python Programming

Subject Name	Code	Type of course	T-P-P	Prerequisite
Python Programming	BCTI2407	Theory + Practice	4-2-0	Nil

1. Objective

- To setup the environment to run the python programs
- To understand concepts about Data Types and Looping techniques
- To understand and implement the OOP concepts, Decorators, and Iterators
- To understand and build the Web Applications
- Debugging and Troubleshooting Python Programs

2. Learning outcome

- Install and Run Python Program
- Write functions and Loops in the python program
- Implementing OOPs concepts while writing Python Program
- Developing web applications using Django
- Build micro services in Python
- Test, Debug and Troubleshoot Python Programs

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report
External Examination	End sem Exam	30	Written examination
	External Lab exam	20	Lab work, report and viva
Total		100	

4. Course outline

Introduction to Python

Module I   **4 Lectures**

Introduction: Introduction to Python, Setting up the environment, Installing Python, Running python program, Python's execution model, Guidelines on how to write good, The Python culture, A note on the IDEs.

Module II   **5 Lectures**

Built-in Data Types: Numbers, Immutable sequences, Mutable sequences, Set types,

Mapping types – dictionaries, the collections module, Final considerations

Iterating and Making Decisions: Conditional programming, Looping, Putting this all together.

Advanced Concepts

Module III   **(4 Lectures)**

Functions, the Building Blocks of Code: Use of functions, Scopes and name resolution, Input parameters, Return values, Recursive functions, Anonymous functions, Function attributes, Built-in functions, importing objects.

Saving Time and Memory: map, zip, and filter, Comprehensions, Generators, Some performance considerations, Name localization, and Generation behavior in built-ins.

Module IV   **(5 Lectures)**

Advanced Concepts – OOP, Decorators, and Iterators: Decorators, Class and object namespaces, Attribute shadowing, Initializing an instance, Accessing a base class, Multiple inheritance, Static and class methods, Private methods and name mangling, The property decorator, Operator overloading, Polymorphism

Web Development

Module V   **(9 Lectures)**

The Edges – GUIs and Scripts: Scripting-The imports, Parsing Arguments, The business logic,

GUI application- The import, The layout logic, The business logic, The tkinter.tixmodule, The turtle module, wxPython, PyQt, and PyGTK, The principle of least astonishment, Threading considerations.

Web Development Done Right: Django design philosophy, The Django URL dispatcher, Setting up Django, Adding the Entry model, Customizing the admin panel, Creating the form, Writing the views, Tying up URLs and views, Writing the templates, Writing a Flask view, Building a JSON quote server in Falcon.

Cloud Native Python

Module VI (9 Lectures)

Building Microservices in Python: Modeling micro services, Building micro services, Testing the REST ful API. Building a Web Application in Python: Getting started with applications, Working with Observables and AJAX, Binding data for the add user template, Working on Observables with AJAX for the addtweet template, Data binding for the add tweet template, CORS - Cross-Origin Resource Sharing, Session management, Cookies. Interacting Data Services: MongoDB terminology, Initializing the MongoDB database, Integrating micro services with MongoDB, Working with user resources, Working with the tweets resources.

Exception Handling

Module VII (9 Lectures)

Testing, Profiling, and Dealing with Exceptions: The anatomy of a test, testing guidelines, unit testing, test-driven development, Exceptions, profiling Python. Debugging and Troubleshooting: Debugging with print, Debugging with a custom function, inspecting the trace back, Using the Python debugger, Inspecting log files, other techniques, troubleshooting guidelines.

PYTHON PROGRAMMING LAB

List of Programs:

1. Write a python code to find given number is prime or not

2. Write a python code to find LCM and GCM of a given list

3. Write a python code to find mean and standard deviation of a given list of numbers

4. Write a python code to add and delete element from a dictionary using functions

5. Write a python code to print 10 student details using class and lists

6. Write a python code to find student from a given list using class

7. Write a python code to inherit employee class to student class

8. Write a python code to build simple GUI calculator

9. Write a python code to build web page with student registration form

10. Write a python code to build web pages with sign-in and sing-up forms

11. Write a python code to buildRest api for product

12. Write a python code to build Ajax enabled web application for product

5. Reference

E-ontent: LMS

TextBooks:

1. Learn Python Programming, 2nd Edition by Fabrizio Romano
2. Python Cookbook, 3rd Edition by David Beazley (Author), Brian K. Jones (Author)

Reference Books:

1. Python Programming: A Step-by-Step Guide For Absolute Beginners by Brian Jenkins and ATS Coding Academy
2. Python and AWS Cookbook: Managing Your Cloud with Python and Boto by Mitch Garnaat
3. Advanced Python Programming: Build high performance, concurrent, and multi-threaded apps with Python using proven design patterns by Dr. Gabriele Lanaro
4. Programming Google App Engine with Python: Build and Run Scalable Python Apps on Google's Infrastructure by Dan Sanderson

6. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Introduction to Python : **Total 9 Hrs +3 Hrs**				
Module I				
Introduction: Introduction to Python, Setting up the environment, Installing Python, Running python program, Python's execution model, Guidelines on how to write good, The Python culture, A note on the IDEs.	4	Lecture	Assignment	Book, Video, Online source
Module II				

Built-in Data Types: Numbers, Immutable sequences, Mutable sequences, Set types, Mapping types – dictionaries, the collections module, Final considerations	5+3	Lecture+ practice	Assignment	Book, Video, Online source
Iterating and Making Decisions: Conditional programming, Looping, Putting this all together.				

Advanced Concepts: Total 9 Hrs +9 Hrs

Module III

| Functions, the Building Blocks of Code: Use of functions, Scopes and name resolution, Input parameters, Return values, Recursive functions, Anonymous functions, Function attributes, Built-in functions, importing objects.

Saving Time and Memory: map, zip, and filter, Comprehensions, Generators, Some performance considerations, Name localization, and Generation behavior in built-ins.	4+3	Lecture+ practice	Assignment	Book, Video, Online source

Module IV

Advanced Concepts – OOP, Decorators, and Iterators: Decorators, Class and object	5+6	Lecture+ practice	Assignment	Book, Video, Online source

namespaces, Attribute shadowing, Initializing an instance, Accessing a base class, Multiple inheritance, Static and class methods, Private methods and name mangling, The property decorator, Operator overloading, Polymorphism				

Web Development: Total 9 Hrs +6 Hrs

Module V

The Edges – GUIs and Scripts: Scripting-The imports, Parsing Arguments, The business logic,GUI application- The import, The layout logic, The business logic, The tkinter.tixmodule, The turtle module, wxPython, PyQt, and PyGTK, The principle of least astonishment, Threading considerations.	9+6	Lecture+ practice	Assignment	Book, Video, Online source

Cloud Native Python: Total 9 Hrs +6 Hrs

Module VI

Building Microservices in Python: Modeling micro services, Building micro services, Testing the REST ful API. Building a Web Application in Python: Getting started with applications, Working with Observables and AJAX, Binding data for the add user template, Working on Observables with AJAX for the addtweet template, Data binding for the add tweet template, CORS - Cross-Origin Resource Sharing, Session management, Cookies. Interacting Data Services: MongoDB terminology, Initializing the MongoDB database, Integrating micro services with MongoDB, Working with user resources, Working with the tweets resources.	9+6	Lecture+ practice	Assignment	Book, Video, Online source

Exception Handling: Total 9 Hrs +6 Hrs

 Module VII

Testing, Profiling, and Dealing with Exceptions: The anatomy of a test, testing guidelines, unit testing, test-driven development, Exceptions, profiling Python. Debugging and Troubleshooting: Debugging with print, Debugging with a custom function, inspecting the	9+6	Lecture+ practice	Assignment	Book, Video, Online source

trace back, Using the Python debugger, Inspecting log files, other techniques, troubleshooting guidelines		93		
Total (hrs)	**45+30** **Hrs**			

Introduction to Cloud Technology

Subject Name	Code	Type of course	T-P-P	Prerequisite
Introduction to Cloud Technology	BCTI 2303	Theory + Practice	4-2-0	Nil

1. Objective

- Cloud computing is a colloquial expression used to describe a variety of different computing concepts that involve 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 securities.

2. Learning 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.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Class Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

4. Course Outline

Module I: Introduction (8 Hrs.)

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 II: Cloud Computing Companies and Migrating to Cloud (5 Hrs.)

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 tocloud.

Module III: Risk Assessment, Measurement & Mitigation Strategies (4 Hrs.)

Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies.

Module IV: Cloud Cost Management (5 Hrs.)

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, selecting the right scalable application.

Module V: Selection of Cloud Provider (5 Hrs.)

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 VI: Governance in the Cloud (8 Hrs.)

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 VII: Ten cloud do and do not's (4 Hrs.)

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 pilotproject.

5. **Reference:**

E Content: LMS Content

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.

Online Resource:

1. https://www.guru99.com/cloud-computing-for-beginners.html

2. https://www.javatpoint.com/cloud-computing-tutorial

3. https://www.tutorialspoint.com/cloud_computing/index.htm

List of Programs:

1. Study the basic cloud architecture and represent it using a case study.

2. Enlist Major difference between SAAS PAAS & IAAS also submit a research done on various companies in cloud business and the corresponding services provided by them , tag them under Saas , Paas&Iaas.

3. Study and present a report on Open Stackcloud.

4. Present a report on obstacles and vulnerabilities in cloud computing on generic level.

5. Present a report on Amazon cloud services.

6. Present a report on Microsoft cloud services.

7. Present a report on cost management on cloud.

8. Enlist and explain legal issues involved in the cloud with the help of a case study.

9. Explain the process of migrating to cloud with a case study.

10. Present a report on Google cloud and cloud services.

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I (8 Hrs)				
Introduction to Cloud Technology: Introduction to Computing, History and Evolution of Cloud Computing, Types of clouds, Private, Public and Hybrid clouds, Cloud	5	Lecture	Assignment/ Activity	Book, Online Source

Obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical application of cloud computing.	3	Lecture	Assignment/ Activity	Book, Online Source
Module-II (5 Hrs.)				
Cloud Computing Companies and Migrating to Cloud: Web-based business services, Delivering Business, Processes from the Cloud: Business process examples.	2	Lecture	Assignment	Book, Online Source
Broad approaches to migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating tocloud.	3	Lecture	Assignment	Book, Online Source
Module-III (4 Hrs.)				
Risk Assessment, Measurement & Mitigation strategies: Risks: Measuring and assessment of risks, Company concerns.	2	Lecture	Assignment	Book, Online Source
Risk Mitigation methodology forCloud computing, Case Studies.	2	Lecture	Assignment	Book, Online Source
Module-IV (5 Hrs.)				

Cloud Cost Management: Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading.	3	Lecture	Assignment	Book, Online Source
Cost cutting and cost-benefit analysis, Selecting the right scalable application.	2	Lecture	Assignment	Book, Online Source
Module-V (5 Hrs.)				
Selection of Cloud Provider: Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers.	2	Lecture	Assignment	Book, Online Source
Clouding the Standards and Best	3	Lecture	Assignment	Book, Online Source
Module-VI (8 Hrs.)				
Governance in the Cloud: Industry Standards Organizations and Groups associated with Cloud Computing, Need for ITgovernance in cloud.	3	Lecture	Assignment	Book, Online Source

Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, APIintegration.	3	Lecture	Assignment	Book, Online Source
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.	2	Lecture	Assignment	Book, Online Source
Module-VII (4 Hrs.)				
Ten cloud do and do not's:	4	Lecture	Assignment	Book, Online Source
Total (hrs)	**39 Hrs.**			

Design and Analysis of Algorithm

Subject Name	Code	Type of course	T-P-P	Prerequisite
Design And Analysis Of Algorithms	BCTI 2408	Theory	3-0-0	Nil

1. **Objective**

This course will help the students to develop efficient data structures and algorithms in a systematic manner. In order to develop efficient software systems, it is essential that efficient algorithms and appropriate data structures are used.

2. **Learning outcome**

At the end of this course, student will able to understand-

- The importance of an Algorithm for Computer solving problems.
- The various measures of an Algorithm
- Various algorithms of Dynamic approach.
- The concept of Brute force Approaches and its different methods.
- Various algorithms of Greedy approach and their importance.
- Various algorithms for Sorting elements .
- Measure the efficiency of sorting Algorithms.
- Concepts of Graph and its Traversing methods

3. **Evaluation Systems**

Internal Examination	Component	% of Marks	Method of Assessment
	Class Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Semester University Examination	60	Written examination
Total		100	

Course Contents-

Module I (Lectures 04)

Role of Algorithms in Computing: Introduction: What is an Algorithm? Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Role of algorithms in computing, Algorithms as a technology.

Module II (Lectures 04)

Fundamentals of the Analysis of Algorithm Efficiency, Asymptotic notation and Basic Efficiency Classes, Algorithm design.

Module III (Lectures 04)

Dynamic Programming: The method, Computing of Binomial Coefficient and Fibonacci Series, All pairs shortest path-Floyd's algorithm, Assembly line scheduling.

Module IV (Lectures 04)

Brute Force Approaches: The method, Exhaustive search – Traveling salesman problem, Assignment problem,.

Module V (Lectures 08)

Greedy Algorithms : The greedy strategy, Greedy methods & optimization, Topological sort, Bipartite cover, Minimum cost spanning trees, Huffman codes, Single source shortest paths-Dijkstra's algorithm

Module VI (Lectures 08)

Sorting, Sets and Selection: Merge sort, The Set Abstract Data Type, Quick sort, Bucket sort, Radix sort, Selection Sort and Bubble Sort, Sequential Search Comparison of sorting algorithms.

Module VII (Lectures 08)

Text Processing and Cryptography: Strings and Pattern matching algorithms, Introduction to cryptography concepts.

Graphs: Graph abstract data type, Data structures for graphs, Graph traversals-BFS, DFS, Directed graphs, weighted graphs

Course Outcome:

Text Books:

1. Introduction to Algorithms. Thomas H Coremen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Second Edition/ Prentice Hall of India Pvt. Ltd 2004.

Reference Books:

1. Data Structures, Algorithms and Applications in C++, Sartaj Sahni, Second Edition. University Press 2005.

2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 2nd Edition Pearson Education

Topic coverage and Internal Test	No of sessions(in hrs)	Activity (lecture, tutorial, lab practice, field studies/field-trip, workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested reading (book, video, online source, etc.)
MODULE-1				
Introduction: What is an Algorithm? Notion of Algorithm, Fundamentals of Algorithmic Problem Solving,	2	Lecture		Book
Role of algorithms in computing, Algorithms as a technology.	2	Lecture		Book
MODULE-2				
Fundamentals of the Analysis of Algorithm Efficiency, Asymptotic notation and Basic Efficiency Classes, Algorithm design.	4	Lecture	assignment	Book
MODULE-3				
The method, Computing of Binomial Coefficient and Fibonacci Series	2	Lecture,Quiz		Book
All pairs shortest path-Floyd's algorithm, Assembly line scheduling	2	Lecture	assignment	Book
MODULE-4				
Brute Force Approaches: The method, Exhaustive search – Traveling salesman problem, Assignment problem,.	4	Lecture	assignment	Book
MODULE-5				
Greedy Algorithms : The greedy strategy, Greedy methods & optimization,	4	Lecture,Quiz		Book

Topological sort, Bipartite cover				
Minimum cost spanning trees, Huffman codes, Single source shortest paths-Dijkstra's algorithm	4	Lecture	assignment	Book
MODULE-6				
Merge sort, The Set Abstract Data Type, Quick sort,	4	Lecture		Book
Bucket sort, Radix sort,	2	Lecture	assignment	Book
Selection Sort and Bubble Sort, Sequential Search Comparison of sorting algorithms.	2	Lecture,Quiz		Book
MODULE-7				
Text Processing and Cryptography: Strings and Pattern matching algorithms, Introduction to cryptography concepts.	4	Lecture	assignment	Book
Graphs: Graph abstract data type, Data structures for graphs, Graph traversals-BFS, DFS, Directed graphs, weighted graphs	4	Lecture		Book

Installation and Configuration of Server

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Installation and Configuration of Server	BCTI 3502	Theory + Practice	4-2-0	NIL

Objective

- Install and configure Windows Server 2012.
- Configure virtual machine and storage.

Learning outcome

- Students will able to install & configure Windows Server2012.
- Student will able to configure virtual machine and storage.

Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report, viva
External Examination	University end sem Exam	30	Written examination
	External Lab exam	20	Lab work, report, viva
Total		100	

Course Outline

MODULE-I: (6 Lectures)

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.

MODULE-II: (6 Lectures)

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-III: (10 Lectures)

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-IV: (10 Lectures)

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-V: (6 Lectures)

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

MODULE-VI: (6 Lectures)

Creating Server Groups, Using Remote Server Administration Tools, Using Windows PowerShell Web Access, Installing Windows PowerShell Web Access, Configuring theWindows PowerShell Web Access Gateway, Configuring a Test Installation, Customizing a Gateway Installation, Creating Authorization Rules, Working with Remote Servers.

MODULE-VII: (8 Lectures)

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 aSAN.

Installation and configuration of Server LAB

1. Installation windows Server2012.

2. Configuration for Windows Server.

3. Configuration Local Storage for Windows Server.

4. Configuration File and Share Access for Windows Server.

5. Configuration Print and Document Services for Windows Server.

6. Configuration windows server for Remote Management.

7. Creating Virtual Machine in Windows Server.

8. Configuration and Setting Virtual Machine.

2. Reference

E-content:www.krackin.com

Text 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)

Reference Books:

1. Installing and Configuring Widows Server 2012 by CraigZacker

2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler.

Online Source: Microsoft academy

3. **Session Plan**

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I : Total 6 Hrs +6 Hrs				
Installing and Configuring Servers:	6+6	Lecture+ practice	Assignment	Book, Video, Online source
MODULE-II: Total 6 Hrs +6 Hrs				
Configuring Servers:	6+6	Lecture+ practice	Assignment	Book, Video, Online source
MODULE-III : Total 10 Hrs +9 Hrs				
Configuring Local Storage	10+6	Lecture+ practice	Assignment	Book, Video, Online source
MODULE-IV : Total 10 Hrs +9 Hrs				
Configuring File and Share Access	10+9	Lecture, lab practice	Assignment, experiment	Book, Online source

MODULE-V : Total 6 Hrs +6 Hrs				
Configuring Print, Document Services, Servers for Remote Management	6+3	Lecture, lab practice	Assignment experiment	Book, Online source
MODULE-VI : Total 6 Hrs +3 Hrs				
Creating Server Groups, Using Remote Server Administration Tools, Using Windows PowerShell Web Access, Installing Windows PowerShell Web Access, Configuring theWindows PowerShell Web Access Gateway, Configuring a Test Installation, Customizing a Gateway Installation, Creating Authorization Rules, Working with Remote Servers.	6+3	Lecture, lab practice	Assignment experiment	Book, Online source
MODULE-VII : Total 8 Hrs +6 Hrs				
Virtualization Architectures, Hyper-V Implementations and Licensing, Using Hyper-V Manager, Creating a VM, Installing an Operating System	3+2	Lecture, lab practice	Assignment experiment	Book, Online source
Configuring Virtual Machine Settings, Virtual Disk Formats, Creating and adding virtual disks to VM	3+2	Lecture, lab practice	Assignment experiment	Book, Online source

Differencing Disks, Configuring Pass-Through Disks, Modifying Virtual Disks, Creating Snapshots, Connecting to a SAN, Connecting Virtual Machines to aSAN.	2+2	Lecture, lab practice	Assignment experiment	Book, Online source
Total (hrs)	**52+45 Hrs**			

Designing Enterprise Network

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Designing Enterprise Network	BCTI 2403	Theory + Practice	4-2-0	Nil

1. Objective

- Understand switching techniques, and configuration of Ciscoswitches.
- Understand different routing protocols and configuration of Ciscorouters.

2. Learning outcome

- Student will able to configure, test and troubleshoot Cisco switches.
- Students will able to configure, test and troubleshoot Cisco routers.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report
External Examination	End sem Exam	30	Written examination
	External Lab exam	20	Lab work, report and viva
Total		100	

4. Course outline

MODULE-I: **(10 Lectures)**

Networking Fundamentals: The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, Fundamentals of WANs, Fundamentals of IPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications

Module –II (8 Lectures)

Ethernet LANs and Switches: Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching.

MODULE-III: (10 Lectures)

IP Version 4 Addressing and Sub netting : Perspectives on IPv4 Subnetting, Analyzing Classfull IPv4 Networks, Analyzing Subnet Masks, Analyzing Existing Subnets

MODULE-IV: (6 Lectures)

Implementing IP Version 4: Operating Cisco Routers, Configuring IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts, Troubleshooting LAN Switching

Module-V (8 Lectures)

LAN Routing : Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); Passive Interface

MODULE-VI: (6 Lectures)

IPv4 Services and IP Version 6: Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security

Module-VII (6 Lectures)

Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing.

Designing Enterprise Network LAB

1. Switch Configuration - Basic Commands

2. Switch Configuration - Switch Port Security

3. Router - Configuration

4. Configuration of IP Address for aRouter

5. Setting up of Passwords

6. PPPEncapsulation,PPPPAPAuthentication,PPPCHAPAuthentication

7. Configuration of Static and Dynamic Routing

8. Configuration of Default Route

9. Implementation of EIGRP

10. Implementation of OSPF

11. VLAN Configuration

12. Switch Troubleshooting

13. Configuration of Access-lists - Standard & Extended ACLs

14. Cisco Discovery Protocol

15. DHCP, DHCP Relay & DHCP Exclusions

16. Configuring Logging to a Remote Syslog Server

5. Reference

E-content: www.krackin.com

Text Books:

1.   CCENT/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

Reference Books:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011

Online Source: www.netacad.com , www.learningnetwork.cisco.com

6. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
MODULE-I Lectures:10 hours Lab:6 hours				
Networking Fundamentals: The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, Fundamentals of WANs, Fundamentals of IPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications	10+6	Lecture, lab practice		Book, Online source
MODULE-II Lectures:8 hours Lab:7 hours				
Ethernet LANs and Switches: Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching.	8+7	Lecture, lab practice		Book, Online source
MODULE-III Lectures:10 hours Lab:6 hours				
IP Version 4 Addressing and Sub netting :Perspectives on IPv4 Subnetting, Analyzing Classfull IPv4 Networks, Analyzing Subnet Masks, Analyzing Existing Subnets	10+6	Lecture, lab practice		Book, Online source
MODULE-IV Lectures:6 hours Lab:7 hours				

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Implementing IP Version 4: Operating Cisco Routers, Configuring IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts, Troubleshooting LAN Switching	6+9	Lecture, lab practice		Book, Online source
MODULE-V **Lectures:8 hours** **Lab:7 hours**				
LAN Routing :Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); PassiveInterface	10+9	Lecture, lab practice		Book, Online source
MODULE-VI **Lectures:6 hours** **Lab: 6 hours**				
IPv4 Services and IP Version 6: Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security	6+6	lecture	assignment	Book, Online source
MODULE-VI **Lectures:6 hours** **Lab: 6 hours**				
Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing.	6+6	lecture	assignment	Book, Online source
Total (hrs)	54+45=99			

Fundamentals of Storage & Data Center

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Fundamentals of Storage & Data Center	BCTI2408	Theory	4-0-0	Nil

1. Objective

- To impart the basic concepts of Storage systems and Datacenter environment.

- To understand concepts about RAID techniques

- To Understand basic concepts about NAS and SAN

- To understanding about taking backup and restoring the data with the help of Business Continuity and Disaster Recovery concepts and tools.

2. Learning outcome

- Explain the Storage devices and technologies.

- Explain the advantages and functionality of NAS and SAN

- Describe Data Center Consolidation and its phases

3. Evaluation Systems

Internal Examination	Component	Marks	Method of Assessment
	Class Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Semester University Examination	60	Written examination
Total		100	

4. Course outline

Module -I (4 Lectures)

Introduction to Storage System

Introduction to Information Storage: Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing

Module –II (6 Lectures)

Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application

Data Protection (RAID): RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison.

MODULE-III: (6 Lectures)

Storage Networking Technologies

Network-Attached Storage: General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization.

MODULE-IV: (6 Lectures)

Fibre Channel Storage Area Networks: Fibre Channel Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN.

IP SAN and FCoE: iSCSI, FCIP, FCoE

MODULE-V: (10 Lectures)

Backup and Disaster Recovery

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions.

Backup and Archive: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.

MODULE-VI: (10 Lectures)

Data Center Consolidation

Reasons for Data Center Consolidation: Reasons for Data Center Consolidation, Consolidation Opportunities,

Data Center Consolidation Phases: Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated.

Best Practices in IT: Defining Best Practices, Deploying Best Practices, Benefits of Best Practices, Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats.

MODULE-VII: (10 Lectures)

Data Center Clusters:

Cluster Architecture: Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices.

Cluster Requirements: Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist.

Designing Cluster-Friendly Applications: Automating Operations, Controlling Application Failover Time, Reducing Data Loss During Failover, Minimizing Application Failures, Designing Node-Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.

Reference:

   E-content: LMS Content

 Text Books:

1. Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by Somasundaram Gnanasundaram Alok Shrivastava

2. Administering Data Centers: Servers, Storage, and Voice over IP By Kailash Jayaswal

 Reference Books:

1. Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Ulf Troppens (Author)
2. Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba.
3. Blade Servers and Virtualization: Transforming Enterprise Computing While Cutting Costs by Barb Goldworm and Anne Skamarock

Online Source:

1. http://estigia.fib.unam.mx/maestria/Administering%20Data%20Centers,%20Servers,%20Storage%20and%20Voice%20Over%20IP%20(Wiley,%202006).pdf

2. http://aad.tpu.ru/practice/EMC/Information%20Storage%20and%20Management-v.2.pdf

3. https://www.amazon.in/Blade-Servers-Virtualization-Transforming-Enterprise/dp/0471783951/ref=sr_1_11?s=books&ie=UTF8&qid=1544082638&sr=1-11&keywords=blade+servers

4. http://www.mustbegeek.com/configure-iscsi-san-in-server-2012-r2/

5. https://www.redhat.com/en/topics/data-storage/network-attached-storage

1. **Session Plan**

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module-I : Total 4 Hrs				
Introduction to Storage System. Introduction to Information Storage: Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing.	4	Lecture	Assignment	EBook, Class Note, Online Source
Module-II: Total 6 Hrs				
Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data	6	Lecture	Assignment	EBook, Class Note, Online Source
Module-III :Total 6 Hrs				

Storage Networking Technologies **Network-Attached Storage:** General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization.	6	Lecture	Assignment	EBook, Class Note, Online Source
Module-IV :Total 6 Hrs				
Fibre Channel Storage Area Networks: Fibre Channel Overview, The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN. **IP SAN and FCoE**: iSCSI, FCIP, FCoE	6	Lecture	Assignment	EBook, Class Note, Online Source
Module-V :Total 10 Hrs				
Backup and Disaster Recovery **Introduction to Business Continuity:** Information Availability, BC	10	Lecture	Assignment	EBook, Class Note, Online Source

Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. **Backup and Archive:** Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.				
Module-VI : Total 10 Hrs				
Data Center Consolidation **Reasons for Data Center Consolidation:** Reasons for Data Center Consolidation, Consolidation Opportunities, **Data Center Consolidation Phases:** Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated. **Best Practices in IT:** Defining Best Practices, Deploying Best Practices, Benefits of Best Practices,	10	Lecture	Assignment	EBook, Class Note, Online Source

Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats.				
Module-VII : Total 10 Hrs				
Data Center Clusters: **Cluster Architecture:** Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices. **Cluster Requirements:** Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist. **Designing Cluster-Friendly Applications**: Automating Operations, Controlling Application Failover Time, Reducing Data Loss During Failover, Minimizing Application Failures, Designing Node-Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.	10	Lecture	Assignment	EBook, Class Note, Online Source
Total (hrs)	52 hrs			

Virtualization and Cloud Security

Subject Name	Code	Type of course	T-P-P	Prerequisite
Virtualization And Cloud Security	BCTI3506	Theory	4-0-0	Principle Of Virtualization, Introduction to Cloud Technology

1. Objective

- Get a clear understanding of topics in Cloud Trust Protocol and Transparency.
- Understand Cloud Control Matrix.

2. Learning outcome

- Students will understand basics of Virtualization and Cloud Security.
- Students will able to understand Cloud Trust Protocols and Transparency and Cloud Control Matrix.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Semester University Examination	60	Written examination
Total		100	

4. course outline

Module I (6 Lectures)

Introduction to Virtualization & Cloud

Virtualization and Cloud computing concepts, Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts.

Module II (7 Lectures)

Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between Guest instances, Security between Hosts and Guests

Module III (7 Lectures)

Cloud Security

Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol

Module IV (6 Lectures)

Cloud Controls Matrix.Complete Certificate of Cloud Security Knowledge (CCSK).

Module V (7 Lectures)

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 VI (6 Lectures)

Cloud Controls Matrix &Top Cloud Threats

Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model,

Module VII (6 Lectures)

Requirements of Security as a Service (SaaS) model and Top Security threats to the cloud model

5. Reference

E-content: LMS Content

Text Books:

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

Online Sources:

1. https://www.javatpoint.com/virtualization-in-cloud-computing

2. https://www.geeksforgeeks.org/virtualization-cloud-computing-types/

3. https://www.youtube.com/watch?v=hPkEqOoQSu4

4. https://www.youtube.com/watch?v=_fGrYN5rxhs&t=3477s

5. https://www.youtube.com/watch?v=2KcZgdsuMto

6. **Session Plan**

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
MODULE I : Total 6 Hrs				
Virtualization and Cloud computing concepts, Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts.	6	Lecture	Assignment	Book, Online source,SLM
MODULE II : Total 7 Hrs				
Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between Guest instances, Security between Hosts and Guests	7	Lecture	Assignment	Book, Online source

Module III : Total 7 Hrs				
Cloud Security Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol	7	Lecture	Assignment	Book,Online,SLM
Module IV : Total 6 Hrs				
Cloud Controls Matrix. Complete Certificate of Cloud Security Knowledge (CCSK).	6	Lecture	Assignment	Book,Online,SLM
Module V : Total 7 Hrs				
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	7	Lecture	Assignment	Book,Online,SLM
Module VI : Total 6 Hrs				
Cloud Controls Matrix &Top Cloud Threats Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model	6	Lecture	Assignment	Book,Online,SLM
Module VII : Total 6 Hrs				
Requirements of Security as a Service (SaaS) model and Top Security threats to the cloud model	6	Lecture	Assignment	Book,Online,SLM
Total (hrs.): 45 Hours (Theory)				

Logical Reasoning & Thinking

Subject Name	Code	Type of course	T-P-P	Prerequisite
Logical Reasoning & Thinking	BCTI3506	Theory	2-0-0	Nil

1. Objective

- Constructing a logical argument based on the rules of inference
- Analyzing and interpreting numerical data
- Applying mathematical methods to solve problems

2. Learning outcome

- Students will able to apply mathematical methods to solve problems and analyze and interpret numerical data
- Students will able to construct logical argument based on the rules of inference

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Semester University Examination	60	Written examination
Total		100	

Module – I: Verbal ability (06 hours)

Synonyms, Antonyms and One word substitutes

Module - II: Basic quantitative aptitude (14 hours)

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 - III: Logical Reasoning - I (14 hours)

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data

Module - IV: Measures of Central Tendency (14 hours)

Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean

Median - median of grouped and ungrouped data merit and limitation of median, computation of quartile, decile and percentile

Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.

Module - V: Presentation of Data (12 hours)

Construction of tables with one or more factors of classification; Diagrammatic and

Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approaches

Life Skills Development (LSD) - IV

Subject Name	Code	Type of course	T-P-P	Prerequisite
Life Skills Development(LSD) - IV	BCTI3508	Lab	0-2-0	Nil

1. Objective

To give students more practice sessions on the essentials of getting placed in good companies by sharpening their skills in terms of Group Discussion & Personal Interview & Resume Writing

2. Learning outcome

This course will help students to be industry ready as there will be a lot of practice sessions to chisel their skills. By the end of the course they will be more confident about themselves in terms of facing Group Discussions & Personal Interviews

3. Evaluation Systems

Internal Examination	Component	Marks	Method of Assessment
	Experiments	50	Lab work, report
External Examination		50	Lab exam, report, Viva Voce
Total		100	

List of Experiments:

LAB-1: WhatisaGD?

- ☐ Types ofGD
- ☐ Essentials of aGD
- ☐ Skills assessed duringGD.

LAB-2: GD practice session (at least twice)

- ☐ Doubt clearing sessions onGD
- ☐ Practice sessions onGD

☐ Structure of aGD

LAB-3: Format of GD

☐ GDasusedinnationallevelrecruitmentboards

☐ Differences between a GD anda debate.

LAB-4: Resume format

☐ Current trends in resume writing

☐ How to write professional resumes

☐ Essentials of resume writing

☐ Difference between a CV and a Resume

LAB-5: Cover letters

☐ Working on Cover letter/email

☐ Being in sync with the current format

LAB-6: Types of interview

☐ Onetoone,manytoone,telephonic,appraisal,placement,discipline,exit

☐ Interview handling skills

☐ Effective way of handling interview questions

LAB-7: Mock interview practice sessions (at least twice),

☐ Doubt clearing on Interview skills

☐ Practice sessions on Interview skills

LAB-8: Grooming

☐ Kinesics, paralanguage and proxemics in interviews

☐ Frequently asked questions during interviews

LAB-9: Presentation Skills – Language Skills

☐ Practicinghowtobeprofessionalandformalinapproach

☐ Formallanguagetobeusedduringpresentation

LAB-10: Body language and Grooming

- ☐ Practicing impromptu presentations

- ☐ Extempore and debates

LAB-11: Presentation Skills – Overall impact

- ☐ Effective strategies of oral presentations

- ☐ Audience analysis

- ☐ Use of media

- ☐ Voice modulation

- ☐ Presentation planning

- ☐ Delivery and appearance research

- ☐ Power point presentations

- ☐ Making technical talk interesting

Information Technology Infrastructure Library

Subject Name	Code	Type of course	T-P-P	Prerequisite
Information Technology Infrastructure Library	BCTI3605	Theory	3-0-0	Nil

1. Objective

- ITIL-compatible tools offer better integration, interaction and compatibility with your global partners, and in addition, sticking to strict ITIL standards from a single vendor can help process integrations go seamlessly and ensure all parties are speaking the same technical language.

- It is always an advantage to understand what types of ITIL tools your global partners are working with and how they rate them. ITIL frameworks provide a homogenous IT environment and eases interactions with other global companies using similar preapproved tools. Managing staff, providing services to customers and creating efficiencies for less money can be daunting tasks for any IT organization.

2. Learning outcome

- After undergoing this subject student will be able to understand the ITIL service strategy, design, and transition.

- They will also be familiar about service improvement and service operation.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Of the semester University Examination	60	Written examination
Total		100	

4. course outline

ITIL Overview and Service Strategy:

MODULE I: (6 Lectures)

ITIL History, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Overview of HPSM and OTRS as service management tool,

MODULE II: (7 Lectures)

Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process, Introduction to ISO 20000Standards

Module– III: (7 Lectures)

Service Design : Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier ManagementProcess.

Module– IV: (7 Lectures)

Service Transition: Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management

MODULE-V: (7 Lectures)

Service Operation : Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfilment Process, The Access Management Process, The Problem Management Process

Continual Service Improvement:

MODULE-VI: (6 Lectures)

Continual Service Improvement principles - CSI and organizational change, Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks, models, standards and quality systems.

MODULE-VI: (5 Lectures)

Continual Service Improvement processes : 7step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management

5. Reference

E-content: LMS

Content Reference

Books:

1. Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office,2010

2. HP operation Manual from HP,2010

3. A Guide to Service Desk Concepts Donna Knapp From Cengage Learning,2010

4. The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers,2008

5. Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair John Wiley and Sons,2008

Online Source:

1. https://www.cio.com/article/2439501/itil/infrastructure-it-infrastructure-library-itil-definition- and-solutions.html

2. https://www.simplilearn.com/itil-key-concepts-and-summary-article

3. https://www.tutorialspoint.com/itil/service_portfolio_management.htm

4. https://www.tutorialspoint.com/itil/service_design_overview.htm

5. https://www.tutorialspoint.com/itil/service_transition_overview.htm

6. https://www.tutorialspoint.com/itil/csi_overview.htm

7. https://www.tutorialspoint.com/itil/service_operation_overview.htm

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module I: Total 6 Hrs.				
ITIL History, Components of the ITIL Library IT Service Management, Organizing for IT Service Management, Technology and Architecture Overview of HPSM and OTRS as service management tool	6	Lecture +PPT	Assignment	Book,OnlineSource,SLM
Module II : Total 7 Hrs.				
Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process,	7	Lecture +PPT	Assignment	Book,OnlineSource,SLM

the IT Financial Management Process, Introduction to ISO 2000 Standards				
Module III: Total 7 Hrs.				
Service Design : Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process.	7	Lecture +PPT	Assignment	Book,OnlineSource,SLM
Module IV: Total 7 Hrs.				
Service Transition: Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management	7	Lecture +PPT	Assignment	Book,OnlineSource,SLM
Module V: Total 7 Hrs.				

Service Operation : Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfilment Process, The Access Management Process, The Problem Management Process.	7	Lecture +PPT	Assignment	Book,OnlineSource,SLM
Module VI: Total 6 Hrs.				
Continual Service Improvement principles - CSI and organizational change, Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks, models, standards and quality systems.	6	Lecture +PPT	Assignment	Book,OnlineSource,SLM

Module VII: Total 5 Hrs.				
Continual Service Improvement processes : 7 step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management	5	Lecture +PPT	Assignment	Book,OnlineSource,SLM
Total (hrs)	**45 Hours**			

Digital Forensics

Subject Name	Code	Type of course	T-P-P	Prerequisite
Digital Forensics	BCTI3606	Theory + Practice	4-2-0	BCTI1104 Information Security Fundamental

1. Objective

To help students to understand how computer forensics is used as a powerful technique in digital investigation and the roles of file systems in Windows and Linux machine for Forensics Investigation. The students will learn the process, various steps, legal aspects, meticulous documentation, tools and techniques involved in computer forensics.

2. Learning outcome

- Explain the overview of Digital Forensics and Professional Conduct.
- Demonstrate the File Systems and Windows Registry in forensic investigation process.
- Identify the phishing mail in Email forensics.
- Analyse the network traffic flows within and outside the network.
- Evaluate the expert witness and writing report considering the cyber law.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

4. Course outline

Computer Forensics

Module I   **(6 Lectures)**

An overview of Digital Forensics, Preparing for Digital Investigations: Following Legal Processes, Understanding Private-Sector Investigations.

Module II   **(8 Lectures)**

Maintaining Professional Conduct, Preparing a Digital Forensics Investigation, Procedures for Private-Sector High-Tech Investigations, Understanding Data Recovery Workstations and Software, Conducting an Investigation

Data acquisition and incident scenes

Module III   **(6 Lectures)**

Understanding Storage Formats for Digital Evidence, Validating Data Acquisitions: Linux validation and Windows validation method.

Module IV   **(8 Lectures)**

Processing Crime and Incident Scenes, Understanding File Systems, Examining NTFS Disk, Understanding the Windows Registry, examining the windows swap file, Log analysis in windows forensic, Windows forensic tools

Module V

Network and cloud forensic   **(10 Lectures)**

Network forensic overview, establishment procedure for network forensic, securing a network, developing procedure for network forensic, collecting network traffic data, examining and analysing network traffic data, legal challenges in cloud forensic, technical challenges in cloud forensic, acquisition in cloud forensic, conducting cloud investigation.COMPUTER FORENSICS AND INVESTIGATION LAB

Module VI:

Email and social media forensic   **(10 Lectures)**

Exploring the role of email in investigation, exploring the role of client and server in email, investigating E-mail crimes and violations: examining E-Mail messages, Examining E-mail headers, Examining additional email files, tracing an Email messages, Understanding Email server, Applying digital forensic to social media, E-mail case studies.

Module VII:

Forensic report writing and ethics for expert witness   **(6 Lectures)**

Understanding the importance of reports, guidelines for writing report, generating report using forensic software, Applying ethics and code to expert witness, organizations with code of ethics, Ethical Difficulties in Expert Testimony, An Ethics Exercise

List of Programs:

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

2. Data Acquisition or Dead Analysis using the tools such as FTK Imager, Linux DD, IXI_Imageretc

3. Preservation of gathered information or image files using the tools such Cryptool or Quick Hash.

4. Evidence or Digital Foot Print Preservations using Software Write Blockers or Windows Registry for Windows platform

5. Memory analysis of Windows and Linux machine using volatility framework

6. Website forensic analysis using FAW ((Forensic Acquisition of Website)

7. Network Forensic using XPLICO tool

8. Log file analysis use Log Analyzer tool.

9. Cloud forensics using FROST and UFED Cloud Analyzer

10. Email header forensic using MailXaminer and eMailTracker Pro

11. Storage media analysis of mobile phone using Autopsy or Sleuth Kit

12. Operating System Forensic using SANS INVETIGATIVE FORENSIC TOOLKIT (SIFT).

5. Reference

E-content: Online sources

Text Books:

1. Guide to Computer Forensics and Investigations by

Nelson Reference Books:

1. Aaron Philipp, David Cowen, Chris Davis ,"Hacking Exposed Computer Forensics", Pub:

McGraw hill-2011

Online Source:

https://forensiccontrol.com/resources/beginners-guide-computer-
forensics http://www.cyberlawsindia.net/computer-forensics1.html
https://www.youtube.com/watch?v=2D5wTo1adbg
https://www.youtube.com/watch?v=7I-dcPi4NNE
https://www.youtube.com/watch?v=CcSCD6ft6PE

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Computer Forensics				
Module I: Theory =6 Hrs lab=3				
An overview of Digital Forensics, Preparing for Digital Investigations: Following Legal Processes, Understanding Private-Sector Investigations.	6+3	Lecture+ practice	Assignment	Book, Video, Online source
Module II: Theory =6 Hrs lab=6				
Maintaining Professional Conduct, Preparing a Digital Forensics Investigation, Procedures for Private-Sector High-Tech Investigations, Understanding Data Recovery Workstations and Software, Conducting an Investigation	8+6	Lecture+ practice	Assignment	Book, Video, Online source

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Data acquisition and incident scenes				
Module III: Theory = 6 Hrs lab=9 hrs				
Understanding Storage Formats for Digital Evidence, Validating Data Acquisitions: Linux validation and Windows validation method.	6+9	Lecture+ practice	Assignment	Book, Video, Online source
Module IV: Theory = 8 Hrs lab=9 hrs				
Processing Crime and Incident Scenes, Understanding File Systems, Examining NTFS Disk, Understanding the Windows Registry, examining the windows swap file, Log analysis in windows forensic, Windows forensic tools	8+9	Lecture+ practice	Assignment	Book, Video, Online source
Module V: Theory = 10 Hrs lab=7 hrs				
Network and cloud forensic Network forensic overview, establishment procedure for network forensic, securing a network, developing procedure for network forensic, collecting network traffic data, examining and analysing network traffic data, legal challenges in cloud forensic, technical challenges in cloud forensic, acquisition in cloud forensic,	10+7	Lecture+ practice	Assignment	Book, Video, Online source

conducting cloud investigation..COMPUTER FORENSICS AND INVESTIGATION LAB				
Module VI: Theory =10 Hrs lab=6 hrs				
Exploring the role of email in investigation, exploring the role of client and server in email, investigating E-mail crimes and violations: examining E-Mail messages, Examining E-mail headers, Examining additional email files, tracing an Email messages, Understanding Email server, Applying digital forensic to social media, E-mail case studies.	10+6	Lecture+ practice	Assignment	Book, Video, Online source
Module VII: Theory =6 Hrs lab=6 hrs				
Forensic report writing and ethics for expert witness .Understanding the importance of reports, guidelines for writing report, generating report using forensic software, Applying ethics and code to expert witness, organizations with code of ethics, Ethical Difficulties in Expert Testimony, An Ethics Exercise	6+5			
Total (hrs)	54 +45			

Cloud Infrastructure Solutions

Subject Name	Code	Type of course	T-P-P	Prerequisite
Cloud Infrastructure Solutions	BCTI 3607	Theory +Practice	4-2-0	Nil

1. Objective

- To impart the overview of Microsoft Azure

- To understand Azure Compute, Storage and Networking Services

- To Manage data protection and security compliance

2. Learning outcome

- Describe the Azure tools to access and manage Azure resources

- Illustrate the deployment of Azure web Apps

- Design and deploy Azure Virtual Machines

- Summarize the Azure Storage account and its components

- Discuss the Azure services to connect from on-premise to Cloud

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	20	Written examination
	Experiments	30	Lab work, report and viva
External Examination	End-Semester University Exam	30	Written examination
	Lab External Exam	20	Lab work, report and viva
Total		100	

4. Course outline

Introduction to Azure Services

Module I   **(6 Lectures)**

Overview of Microsoft Azure: Technical Requirements, Azure basics, Azure tools, Overview of Microsoft Azure Core Services, Administrative roles and role-based access control.

Module II   **(8Lectures)**

Design and implement Azure App Service Web Apps: Deploy web apps**,** Configure web apps, Configure diagnostics, monitoring, and analytics, Configure web apps for scale and resilience.

.**Managing a Virtual Machine**

Module III   **(6 Lectures)**

Understanding Storage Formats for Digital Evidence, Validating Data Acquisitions: Linux validation and Windows validation method.

Module IV   **(6 Lectures)**

Design and deploy ARM templates: Implement ARM templates, Control access, Design role-based access control (RBAC).

Module V

Implementing Storage and Networking Strategy   **(8 Lectures)**

Design and implement a storage strategy: Implement Azure Storage blobs and files, Manage access, Configure diagnostics, monitoring, and analytics, Implement storage encryption.

Implement Virtual Networks: Configure Virtual Networks, Design and implement multi-site or hybrid network connectivity, Configure ARM VM Networking, Design and implement a communication strategy.

Module VI:

Manage Azure Security and Identities forensic   **(10 Lectures)**

Manage Azure Security and Recovery Services: Manage data protection and security compliance, Implement recovery services.

Manage Azure Identities: Monitor On-Premises Identity Infrastructure and Synchronization Services with Azure AD Connect Health, Manage Domains with Active Directory Domain Services, Integrate with Azure Active Directory (Azure AD), Implement Azure AD B2C and Azure AD B2B.

Module VII:

Manage Azure Operations   **(10 Lectures)**

Enhance cloud management with automation: Implement PowerShell runbooks, Integrate Azure Automation with Web Apps, Create and manage PowerShell Desired State Configurations (DSC), Import DSC resources, Generate DSC node configurations, Monitor and automatically update machine configurations with Azure Automation DSC. Collect and analyze data generated by resources in cloud and on-premises environments: Collect and search across data sources from multiple systems, Build custom visualizations, Visualize Azure resources across multiple subscriptions, Transform Azure activity data and managed resource data into an insight with

List of Programs:

1. Create and document the process of creating a windows azureaccount

2. Create a virtual machine from the gallery of windows server 2008R2

3. Create a virtual machine using the option "quickCreate"

4. Create a custom VM and Capture theimage

5. Create a vm from a captured image

6. Add a VMs to a cluster and deploy load balancer on thesame

7. Create and publish / host a webpage in windowsazure

8. Create a website using Visualstudio

9. Create a SQL server DB , Create tables and add data to thetable

10. test basic sql commands on the table created in the previousstep.

11. Migrate an on premise DB toAzure

12. Create a storage account inAzure

5. Reference

E-content: Online sources

Text Books:

1. Exam Ref 70-533 Implementing Microsoft Azure Infrastructure Solutions 2nd Edition Rick Rainey Michael Washam Dan Patrick Steve Ross.
2. Implementing Microsoft Azure Infrastructure Solutions by Melony QIN

Reference Books:

1. Introducing Windows Azure for IT Professionals by Mitch Tulloch
2. Architecting Microsoft Azure Solutions by Sjoukje Zaal

7. Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity (lecture, tutorial, lab practice, field studies/field-trip, Workshop etc.)	Assignment (project, assignment, field study, seminar, etc.)	Suggested Reading (Book, Video, Online source, etc.)
Module I: Theory =6 Hrs lab=6				
Introducing Windows Azure for IT Professionals by Mitch Tulloch Architecting Microsoft Azure Solutions by Sjoukje Zaal	6+6	Lecture+ practice	Assignment	Book, Video, Online source
Module II: Theory =6 Hrs lab=6				
Design and implement Azure App Service Web Apps: Deploy web apps, Configure web apps, Configure diagnostics, monitoring, and analytics, Configure web apps for scale and resilience.	8+6	Lecture+ practice	Assignment	Book, Video, Online source
Module III: Theory = 6 Hrs lab=6 hrs				

Understanding Storage Formats for Digital Evidence, Validating Data Acquisitions: Linux validation and Windows validation method.	6+6	Lecture+ practice	Assignment	Book, Video, Online source

Module IV: Theory = 6 Hrs lab=6 hrs

Design and deploy ARM templates: Implement ARM templates, Control access, Design role-based access control (RBAC).	6+6	Lecture+ practice	Assignment	Book, Video, Online source

Module V: Theory = 8 Hrs lab=7 hrs

Design and implement a storage strategy: Implement Azure Storage blobs and files, Manage access, Configure diagnostics, monitoring, and analytics, Implement storage encryption. Implement Virtual Networks: Configure Virtual Networks, Design and implement multi-site or hybrid network connectivity, Configure ARM VM Networking, Design and implement a communication strategy.	8+7	Lecture+ practice	Assignment	Book, Video, Online source

Module VI: Theory =10 Hrs lab=9 hrs

Manage Azure Security and Recovery Services: Manage data protection and security compliance,	10+9	Lecture+ practice	Assignment	Book, Video, Online source

Implement recovery services. **Manage Azure Identities:** Monitor On-Premises Identity Infrastructure and Synchronization Services with Azure AD Connect Health, Manage Domains with Active Directory Domain Services, Integrate with Azure Active Directory (Azure AD), Implement Azure AD B2C and Azure AD B2B. .				
Module VII: Theory =10 Hrs lab=5 hrs				
Enhance cloud management with automation: Implement PowerShell runbooks, Integrate Azure Automation with Web Apps, Create and manage PowerShell Desired State Configurations (DSC), Import DSC resources, Generate DSC node configurations, Monitor and automatically update machine configurations with Azure Automation DSC. Collect and analyze data generated by resources in cloud and on-premises environments: Collect and search across data sources from multiple systems, Build custom visualizations, Visualize Azure resources across multiple	10+5			

subscriptions, Transform Azure activity data and managed resource data into an insight with				
Total (hrs)	52 +45			

Software Engineering

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Software Engineering	BCTI 3608	Theory	3-0-0	Nil

1. Objective

- Software engineering is concerned with developing and maintaining software systems that behave reliably and efficiently and satisfy all the requirements that customers have defined for them.

- The units emphasizes on requirements of software, its prototyping, designing and finally testing of software.

2. Learning outcome

- Students will learn how to build software genuinely useful and usable by the customer and satisfies all the requirements defined for it.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Midterm Test	30	Written examination
	Assignment	5	Report and Presentation
	Attendance	5	Class Attendance
External Examination	End Of the semester University Examination	60	Written examination
Total		100	

Module-I: Introduction To Software Engineering

Introduction, Software Components, Characteristics, Issues; Need of Software Life Cycle Models: Phases, Advantages, Disadvantages; Software Life Cycle Models: Waterfall, iterative, Spiral, Prototyping; Comparison of Different Models.

Module-II:Software Project Management
Responsibilities of a Software Project Manager; Project Planning: Estimation, Scheduling, Staffing, Risk Management; Metrics for Project Size Estimation: Lines of Code (LOC), Function Point-COCOMO Model, Delphi Method, Feature Point; Project Estimation Techniques: Empirical, Heuristic, Analytical; Staffing and Scheduling; Risk Management

Module-III: Requirement Analysis And Specifications
Requirement Analysis and Specification; Software Requirement and Specification (SRS): Characteristics, Importance, Organization; Formal System Specification; Axiomatic Specification; Algebraic Specification

Module-IV: Software Design, Interface Design And Coding
Basic Concept of Software Design; Cohesion and Coupling: Definition, Classification Function Oriented Software Design: Overview, Structured Analysis, Data Flow Diagram, Structured Design; Object Oriented Software Design: Overview, UML, UML Diagrams-Use Cases, Class, Interaction, Activity, State Chart Diagram ; User Interfaces: Characteristics, Types; Coding: Standards, Guidelines, Review

Module-V: 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-V: Software Reliability, Maintenance And Reuse
Software Reliability and Quality Management; SEI Capability Maturity Model Computer Aided Software Engineering; Software Maintenance: Need, Characteristics, Types; Software Reverse Engineering. ; Reuse

Reference Books :

1. Fundamentals of Software Engineering, Rajib Mall
2. R. S. Pressman, "Software Engineering: A Practitioners Approach", McGraw Hill

Project

Subject Name	Code	Type of course	T-P-P	Prerequisite
Project	BCTI 3604	• Project	0-0-6	

1. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Project	50	Report, presentation, viva
External Examination	Project	50	Report, presentation, viva
Total		100	