School of Applied Sciences

Centurion University of Technology & Management

B.Sc. in Information Technology
(Specialization in Cloud Technology and Information Security)

(Three years program)

2018

Course Structure

		SEMESTER I		
Sl. No.	**Subject Code**	**Subject Name**	**Subject Type T-P-PJ**	**Credits**
1	FCBS 0101	Environmental Science	2+0+0	2
2	BCTI 1102	Problem Solving technique and programming in C	4+0+0	4
3	BCTI 1103	Problem Solving technique and programming in C Lab	0+2+0	2
4	BCTI 1104	Information Security Fundamental	4+0+0	4
5	BCTI 1105	Information Security Fundamental Lab	0+2+0	2
6	BCTI 1106	Operating System	4+2+0	6
		Total		**20**

SEMESTER II				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-PJ	Credits
1	BCTI 1201	Introduction to communication science	2+0+0	2
2	BCTI 1202	Database Management System	4+2+0	6
3	BCTI 1203	Object Oriented Programming with C++	4+2+0	6
4	BCTI 1204	Network Security Basics	4+2+0	6
		Total		**20**

SEMESTER III				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-PJ	Credits
1	BCTI 2302	Principles of Virtualization	4+2+0	6
2	BCTI 2303	Introduction to Cloud Technology	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
5	BCTI2307	Introduction to Web Technology	4+2+0	6
6	**Inter Disciplinary Subjects**	Generic Elective – 1		**6**
		Total		**32**

SEMESTER IV				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-PJ	Credits
1	BCTI0402	Ethical Hacking Fundamentals	4+2+0	6
2	BCTI2407	Java Programing	4+2+0	6
3	BCTI3506	Virtualization and Cloud Security	4+0+0	4
4	FCHU0213	Life Skill Development – I	0-2-0	2
5	**Inter Disciplinary Subjects**	Generic Elective -2		6
		Total		**24**

SEMESTER V				
Sl. No.	Subject Code	Subject Name	Subject Type T-P-PJ	Credits
1	BCTI 2403	Designing Enterprise Network	4+2+0	6
2	BCTI 3502	Installation and configuration of Server	4+2+0	6
3	BCTI3505	Python Programming	4+2+0	6
4	BCIT2408	Fundamentals of Storage and Data Centre	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		**26**

SEMESTER VI				
Sl. No.	**Subject Code**	**Subject Name**	**Subject Type T-P-PJ**	**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: (12Lectures)

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 Technique and Programming in C

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Problem Solving Technique and Programming in C	BCTI 1102	Theory	4-0-0	

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	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: (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 Yashwant Kanetkar, 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 open courseware

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**	Lecture	Assignment	Book, Online Source

Constants & Variables, Operators & Expressions, Control constructs-if then, for, while loop.				
Arrays: single & multidimensional arrays.	4	Lecture	Assignment	Book, Online Source
Functions: Fundamentals, general form, function arguments, return value.	3	Lecture	Assignment	Book, Online Source
Basic I/O-formatted and Unformatted I/O, Advanced features: Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, * operator, Type casting, type conversion.	**3**	Lecture	Assignment	Book, Online Source
Module-II (20 Lectures)				
Advanced programming Techniques:	4	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	Lecture	Assignment	Book, Online Source
Dynamic data structures in C :Pointers: The & and * operator, pointer expression, assignments, arithmetic, comparison, mallocvscalloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function	**6**	Lecture	Assignment	Book, Online Source

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	Lecture	Assignment	Book, Online Source

enumerated data-types, typedef.				
Module-III (12 Lectures)				
Additional features: File Handling: The file pointer, file accessing functions, open, close, puc, getc, print,	6	Lecture	Assignment	Book, Online Source
C Preprocessor: #define, #includes, #under, Conditional compilation directives. **C standard library and header files:** Header files, string functions, mathematical functions, Date and Time functions	6	Lecture	Assignment	Book, Online Source
Total (hrs)	52 hrs			

Problem Solving Technique and Programming in C

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Problem Solving Technique and Programming in C	BCTI 1103	Lab	0-2-0	

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

4. Course Outline

List of Programs:
Part A

1 Printing the reverse of an integer.

2 Printing the odd and even series of Numbers.

3 Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().
4 Input a string and find the number of each of the vowels appear in the string.

5 Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.

6 Printing the reverse of a string.

Part B

1 Searching an element in an array using pointers.

2 Checking whether the given matrix is an identity matrix or not.
3 Finding the first N terms of Fibonacci series.

4 Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.

5 Define a structure with three members and display the same.

6 Declare a union with three members of type integer, char, string and illustrate the use of union. 7 Recursive program to find the factorial of an integer.

8 Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
9 Arranging N numbers in ascending and in descending order using bubble sort.

10 Addition and subtraction of two
matrices.11 Multiplication of two matrices.

12 Converting a hexadecimal number into its binary equivalent.
13 Check whether the given string is a palindrome or not.

14 Demonstration of bitwise operations.

15 Applying binary search to a set of N numbers by using function.

16 Create a sequential file with three fields: empno, empname, emphasis. Print all the details in a neat format by adding 500 to their basic salary.

5.   **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.)
1. Printing the reverse of aninteger. 2. Printing the odd and even series of N numbers.	**3 hrs**	Demonstration and practice	Report writing and practice	

3. Get a string and convert the lowercase to uppercase and vice-- versa using getchar() and putchar().				
4. Input a string and find the number of each of the vowels appear in the string. 5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end. 6. Printing the reverse of a string.	**3 hrs**	Demonstration and practice	Report writing and practice	
7. Searching an element in an array using pointers.	**3 hrs**	Demonstration and practice	Report writing and practice	
8. Checking whether the given matrix is an identity matrix or not.	**3 hrs**	Demonstration and practice	Report writing and practice	
9. Finding the firstN terms of Fibonacci series. 10. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.	**3 hrs**	Demonstration and practice	Report writing and practice	

11. Define a structure with three members and display the same. 12. Declare a union with three members of type integer, char, string and illustrate the use of union.	**3 hrs**	Demonstration and practice	Report writing and practice	
13. Recursive program to find the factorial of an integer. 14. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.	**3 hrs**	Demonstration and practice	Report writing and practice	
15. Arranging Numbers in ascending and in descending order using bubble sort. 16. Addition and subtraction of two matrices.	**3 hrs**	Demonstration and practice	Report writing and practice	
17.Multiplication of two matrices.	**3 hrs**	Demonstration and practice	Report writing and practice	
18. Converting a hexadecimal number into	**6 hrs**	Demonstration and practice	Report writing and	

its binary equivalent. 19. Check whether the given string is a palindrome ornot.			practice	
20. Demonstration of bitwise operations.	**3 hrs**	Demonstration and practice	Report writing and practice	
21. Applying binary search to a set of N numbers by using a function.	**3 hrs**	Demonstration and practice	Report writing and practice	
22. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.	**3 hrs**	Demonstration and practice	Report writing and practice	
Total (hrs)	42 hrs			

Information Security Fundamental

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Information Security Fundamental	BCTI 1104	Theory	4+0+0	Nil

Objective

- Get a clear understanding of Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security.

- Understand C I A of Security and Ease of Use Triangle in Information Security.

- Understand Access Controls and Physical security measures to safeguard the Assets.

Learning outcome

- Students will understand the importance of CIA Traid (Confidentiality, Integrity and Availability) and advantage of Security.

- The student will be able to safeguard their Assets.

- Student will be aware about the Cyber Law and its need.

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	

1. Course outline

MODULE-I: **(20Lectures)**

Introduction to Information Security: Introduction: Security Definition, Why Security, Security and its need, Current Trends and Statistics, Basic Terminology, The C I A of Security the Relation: Security functionality and Ease of Use Triangle.

User Identity and Access Management: User identity and Access Management: Authentication, Account Authorization, Validation, Access Control and Privilege management. Hashing and Cryptography- Encryption and Decryption

MODULE-II: **(15Lectures)**

System And Server Security: System Security, Desktop & Server Security, Firewalls, Password cracking Techniques, Key-logger, viruses and worms, Malwares & Spy wares, Windows Registry.

Internet Security: Internet Security: LAN Security, Email Security, Hacking attacks, preventive measures.

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

RISK ASSESSMENT AND CYBER LAWS (12L) Vulnerability Assessment, Penetration Testing**,** Cyber Laws

2. Reference

E-content: LMS Content

Text Books:

1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010

Online Sources:

1. http://www.cengage.com/resource_uploads/downloads/1111138214_259146.pdf

2. http://www.eecs.yorku.ca/course_archive/2013-4/F/4482/CSE4482_01_Introduction_2013_posted.pdf

3. http://iso-27001-2013.blogspot.in/2015/05/information-security-professionals.html

4. https://www.sans.org/reading-room/whitepapers/services/identity-access-management-solution-1640

5. http://searchsecurity.techtarget.com/definition/access-control

6. http://searchsecurity.techtarget.com/definition/access-control

7. http://www.slideshare.net/ColMukteshwarPrasad/cyber-law-crime-m

8. ftp://mail.im.tku.edu.tw/Prof_Liang/IRM/10%20An%20Introduction%20to%20Factor%20Analysis%20of%20Information%20Risk.pdf

9. http://www.wciapool.org/pdf/Tab_5_10_Immutable_LawsofSecurity.pd

10. https://www.sans.org/reading-room/whitepapers/basics/vulnerability-assessment-421

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 1 (Theory- 20 Hours)				
Introduction to Information Security (Theory -7 Hours)				
Security Definition, Why Security, Security and its need	2	Lecture	Assignment	Book, Online source,SLM
Current Trends and Statistics, Basic Terminology	2	Lecture	Assignment	Book, Online source,SLM
The C I A of Security the Relation: Security functionality and Ease of UseTriangle	3	Lecture	Assignment	Book, Online source,SLM,Self Note
User Identity And Access Management (Theory- 13 Hours)				
User identity and Access Management: Authentication, Account Authorization	3	Lecture	Assignment	Book, Online source
Validation, Access Control and Privilege management.	2	Lecture	Assignment	Book, Online source
Hashing	4	Lecture	Experiment	Book, Online source

Cryptography- Encryption and Decryption	4	Lecture	Assignment	Book, Online source,SLM,Self Note
Module II (Theory – 15 Hours)				
System And Server Security (Theory- 9 Hours)				
System Security, Desktop & Server Security	2	Lecture	Assignment	Book,Online ,SLM
Firewalls	2	Lecture	Experiment	Book,Online ,SLM,Self Note
Password cracking Techniques	2	Lecture	Experiment	Book,Online ,SLM
Key-logger	1	Lecture	Experiment	Book,Online ,SLM
viruses and worms, Malwares & Spy wares	1	Lecture	Assignment	Book,Online ,SLM
Windows Registry	1	Lecture	Experiment	Book,Online ,SLM
Internet Security (Theory- 6 Hours)				
LAN Security	2	Lecture	Assignment	Book,Online,SLM
Hacking attacks, preventive measures	2	Lecture	Assignment	Book,Online,SLM
Security on E-mail	2	Lecture	Assignment	Book,Online,SLM
Module III (Theory- 10 Hours)				
Risk Assessment And Cyber Laws (Theory- 10 Hours)				
Vulnerability Assessment	2	Lecture	Experiment	Book,Online ,SLM
Penetration Testing	2	Lecture	Assignment	Book,Online,SLM
Risk Assessment	2	Lecture	Assignment	Book,Online,SLM
Threat, Vulnerability	2	Lecture	Assignment	Book,Online,SLM
Cyber Laws – Indian Context.	2	Lecture	Assignment	Book,Online,SLM
Total (hrs): 45 Hours (Theory- 45 Hours)				

Information Security Fundamental Lab

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Information Security Fundamental Lab	BCTI1105	**Lab**	**0-2-0**	**Nil**

1. Objective

1. Student will get exposure towards Configuration, Service Management of Windows 7.
2. Student will get exposure towards Event Logger Analysis, Window Registry Analysis Tool, Steganography, Password Cracking Tools.

2. Learning outcome

1. Student will learn to Configure Windows7.

2. Student will learn to protect the system using Password Based Authentication and Cracking System.

3. Evaluation Systems

Internal Examination	Component	% of Marks	Method of Assessment
	Lab Internal Test	50	Lab work, Report, Viva
External Examination	Lab External Test	50	Lab work, Report, Viva
Total		100	

4. Course outline
List of
Programs:
1. System Security Configuration in Windows7
2. Password based Authentication process
3. Hashes and message digests calculation using has calculators
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

6. Reference

E-content:

TextBooks:

1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010

Online Sources:

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.)
INFORMATION SECURITY FUNDAMENTALS LAB (Practice = 48 Hours)				
System Security Configuration in Windows 7	6 Hrs	Practice	Experiment	Online,Video
Password based Authentication process	6 Hrs	Practice	Experiment	Online
Hashes and message digests calculation using has calculators	6 Hrs	Practice	Experiment	Online
Service Management of Windows 7 for prevention of attacks	6 Hrs	Practice	Experiment	Online ,Video
Password cracking using Brute force, Dictionary and Rainbow attack	6Hrs	Practice	Experiment	Online

Hiding information using Steganography tools	6 Hrs	Practice	Experiment	Online
Event logger analysis	6 Hrs	Practice	Experiment	Online ,Video
Windows Registry analysis	6 Hrs	Practice	Experiment	Online
Total (hrs): Practice = 48 Hours				

Operating System

Subject Name	Code	Type of course	T-P-PJ	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	

4. Course outline

MODULE-I: (20 Lectures)

Introduction: System Software, Resource Abstraction, OS strategies, Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems. **Operating System Organization:** Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services – system calls and system programs.

MODULE-II: (15Lectures)

Process Management : System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model Scheduling: Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies.

MODULE-III: (17 Lectures)

Memory Management: Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory, Shell introduction and Shell Scripting-

1. What is shell and various type of shell, Various editors present in Linux

2. Different modes of operation in VI editor

3. What is shell script, Writing and executing the shell script

4. Shell variable (user defined and system variables)

5. System calls, Using system calls

6. Pipes and Filters

7. Decision making in Shell Scripts (If else, switch), Loops inshell

8. Functions

9. Utility programs (cut, paste, join, tr , uniqutilities)

10. Pattern matching utility(grep)

OPERATING SYSTEMS LAB

List of Programs:

Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands:

ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.

2. Usage of following commands:

cal, cat(append), cat(concatenate), mv, cp, man, date.

3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.

4. Write a shell script to check if the number entered at the command line is prime ornot.

5. Write a shell script to modify "cal" command to display calendars of the specified months.

6. Write a shell script to modify "cal" command to display calendars of the specified range ofmonths.

7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid". Write a shell script to display date in the mm/dd/yy format.

8. Write a shell script to display on the screen sorted output of "who" command along with the total number of users.

9. Write a shell script to display the multiplication table any number,

10. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.

11. Write a shell script to find the sum of digits of a given number.

12. Write a shell script to merge the contents of three files, sort the contents and then display them page bypage.

13. Write a shell script to find the LCD(least common divisor) of two numbers.

14. Write a shell script to perform the tasks of basic calculator.

15. Write a shell script to find the power of a given number.

16. Write a shell script to find the factorial of a given number.

17. Write a shell script to check whether the number is Armstrong or not.

18. Write a shell script to check whether the file have all the permissions or not.

19. Program to show the pyramid of special character"*".

6. **Reference**

E-content: LMS Content

Reference Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications2008.

2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.

3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education1997.

4. W. Stallings, Operating Systems, Internals &Design Principles, 5th Edition, Prentice Hall of India.2008.

5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill1992.

Online Source:

1. Operating Systems fromscratch-Part1.

2. The Complete VMware vSphere 6.5: Beginner toAdvanced-Part2.

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 Theory = 20Hours, Practice=12 hours)				
Introduction: System Software, Resource Abstraction, OSstrategies.	3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM

	5+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems.				
Operating System Organization: Factors in operating system design, basic OS functions.	5+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Implementation consideration; process modes.	2+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Methods of requesting system services – system calls and system programs.	5+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Module II (Total Theory = 15 Hours, Practice=12 hours)				
Process Management : System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy	7+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Thread model Scheduling: Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies.	8+9	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Module-III (Total Theory = 17 Hours, Practice=15 hours))				
Memory Management: Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition.	5+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Paging, virtual memory.	5+3	Lecture + lab Practice	Assignment	Book,Online Sources,SLM

Shell introduction and Shell Scripting	7+9	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Total (hrs)	**Total = 91 Hours (Theory =52 Hours, Practice=39 Hours)**			

Introduction to Communication Science

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Introduction to Communication Science	BCTI 1201	Theory	2-0-0	

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	

1. Course Outlines

MODULE-I: (10Lectures)

Communication in Business: Role of Communication in Business - Main forms of Communication in Business - Communication process - Coding and decoding - Roots of misunderstanding - Inferential model - Original message and reconstructed message - Symbols mismatch implications -Non-verbal symbols - Verbal symbols - Seven communication roadblocks - Communicating across cultures.

MODULE-II: (10Lectures)

Managerial Writing: 7cs of written communication, Business letters - Stationery - Format and layout

-E-mail - Managing the mailbox - Presenting mail – Commonsense and etiquette. Report Writing - Parts of a report - Qualities of a good report - Improving writing skills, Internal communication through memos, minutes, notices &reports.

MODULE-III: (10 Lectures)

Sample Business Letters : Types of Business letters - routine letters, bad news and persuading letters, sales letters, Inquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Claims & Adjustments, collection letters, job application letters, Curriculum Vitae / Resume - Invitation to interview - Offer of employment - Letter of acceptance -Letter of resignation - Recommendation letter, Logical Traps

Text Books:

1. Matthukutty M Monippally, Business Communication Strategies, TataMcGraw-Hill.

Reference Books:

1. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, &Applications,Pearson Education.

2. Shirley Taylor, Communication for Business, PearsonEducation.

3. Lesiicar and Flatley, BasicBusiness Communication, TataMcGraw-Hill.

4. Courtan L. Bovee et al., Business Communication Today, PearsonEducation.

Database Management Systems

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Database Management Systems	BCTI 1202	Theory & Lab	4-2-0	Nil

1. 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). To make 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.

2. 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	

3. Course outline

Module   **(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 normal form.

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, drop table

DML Commands

• Select , update, delete, insert statements

• 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 same tables)

• Nested select statements

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

exists, union, intersect, minus, etc.)

• Categorization using group by……..having

• Arranging using order by

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 addresss 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"eitherasaworkerorasamanagerofthedepartment thatcontrolsthe 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 theemployee.

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

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 employees to „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 has some 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 to NULL

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

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. SessionPlan

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			

Network Security Basics

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Network Security Basics	BCTI 1204	Theory + Practice	4-2-0	Nil

Objective

- Network Security provides a foundation for students to become proficient in basic and advanced conceptsofnetworksecurity.Itprovidesaplatformforstudentstoapplythesesecurityconcepts

Learning outcome

- After studying this course, students will get an overview of basic network security concepts. Students can identify the different types of security attacks and threats to the organizations.
- They will also be able to make use of diverse measures to detect and avoid these security threats.

1. 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	

Course Outline

MODULE-I: (10 Lectures)

Introduction To Network Security: Introduction of Unit , Perimeter Security ,Overview of Network Security , Access Control ,Device Security, Security features on Switches , Firewall, Types of firewall, Attack vector and Mitigation techniques, Access Management

- Securing Management Access, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and Network Admission Control (NAC).

MODULE-II: (20Lectures)

Threats, Vulnerabilities And Attacks : Introduction of Unit, Threat, Vulnerabilities – vulnerability assessment and vulnerability scanning, Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks, Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network – Network Administrative Principles and Securing Network Application.

Network Security Management : Secure Socket Layer (SSL) – Introduction to SSL,OpenSSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI), Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLSVPN).

MODULE-III: (15 Lectures)

Network Security Controls: Network Intrusion Prevention, Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS High Availability, Host Intrusion Prevention, Anomaly Detection and Mitigation.

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

NETWORK SECURITY BASICS LABS

List of Experiment:

1. Firewall Configuration -I

2. Firewall Configuration -II

3. VPN Configuration -I
4. VPN Configuration -II
5. IDS Configuration -I
6. IDS Configuration -II
7. IDS Configuration -III
8. Router Security -I
9. Router Security -II
10. Router Security -III
11. Traffic Monitoring using WireShark -I
12. Traffic Monitoring using WireShark -II

6. **Reference**

E-content: LMS Content

Reference Books:

1. Security   +   Guide   to   Network   Security   Fundamentals   Mark   Ciampa Course Technology, CengageLearning.

2. CCIE Professional Development Series Network Security Technologies and Solutions YusufBhaiji CCIE No. 9305, CISCOPress.

3. Network Security with Open SSL Pravir Chandra, Matt Messier, John ViegaO'Reilly.

Online Source:

1. Computer Networks Security from Scratch toAdvanced.

2. Network Security Analysis Using Wireshark, Snort, andSO

3. Nmap: Network Security Scanning Basics &AdvancedTechniques

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 Theory = 10 Hours, Practice = 9 Hours)				
Introduction To Network Security:	3+3	Lecture + lab	Assignment	Book,Online

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Introduction of Unit , Perimeter Security ,Overview of Network Security.		Practice		Sources,SLM
Access Control ,Device Security, Security features on Switches , Firewall, Typesoffirewall.	3+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Attack vector and Mitigation techniques, Access Management - Securing Management Access, Multifactor Authentication, Layer 2 Access Control.	4+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Wireless LAN (WLAN) Security and Network Admission Control (NAC).	4+0	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Module II (Total Theory = 20 Hours , Practice =12 Hours)				
Threats, Vulnerabilities And Attacks: Introduction of Unit, Threat, Vulnerabilities – vulnerability assessment and vulnerabilityscanning.	3+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks, Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements.	5+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Administering a Secure Network – Network Administrative Principles and Securing Network Application.	3+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM

Network Security Management: Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure(PKI).	5+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN).	4+0	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Module-III (Total Theory = 15 Hours, Tutorial =9 Hours)				
Network Security Controls: Network Intrusion Prevention, Overview of	8+6	Lecture + lab Practice	Assignment	Book,Online Sources,SLM
Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS High Availability, Host Intrusion Prevention, Anomaly Detection and Mitigation.				
Network Management: Security Monitoring and correlation, Security Management - Security and Policy Management and Security Framework and Regulatory Compliance, Best Practices Framework, Case Studies.	7+3	Lecture + lab Practice	Assignment	Book,OnlineSources,SLM
Total (hrs)	**Total = 75Hours (Theory =45 Hours , Lab Practice =30 Hours)**			

Subject Name	Code	Type of course	T-P-P	Prerequisite
Principles of Virtualization	BCTI 2302	Theory & Lab	4-2-0	BCTI1106 Operating System

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

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.

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 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 maintain images.

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 Vsphereclient.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 usersonDatacenter.

6. **Reference**

E-content:

www.krackin.com Text

Books:

1. Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner,AaronTiensivu, 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 settingsto 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		

Introduction to Cloud Technology

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Introduction to Cloud Technology	BCTI 2303	Theory & Lab	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 to cloud.

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

ServiceManagement, do start with a pilot project.

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 Stack cloud.

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

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 googlecloud 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 computing architecture, infrastructure, merits of cloud computing	5	Lecture	Assignmen t/ 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 Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with CloudComputing, Commercial and Business Consideration.	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 BusinessConsideration s.	2	Lecture	Assignment	Book, Online Source
Module-VII (4 Hrs.)				
Ten cloud do and do not's: Don't be reactive, do	4	Lecture	Assignment	Book, Online Source

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 center piece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.				
Total (hrs)	**39 Hrs.**			

IT Governance, Risk and Information Security Management

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

Objective

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

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

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.

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	

Course outline

MODULE-I (8Lectures)

IT Governance-Part 1

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.

MODULE-II

IT Governance-Part 2

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 decisioning 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.

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 ResultsbyWeill, 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, RiskITandValIT

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)

Online Source: 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 Culture in the organization.	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.	2	Lecture	Assignment	Book, Online Sources
Risk Management Process, Roles and Responsibilities				
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	4	Lecture	Assignment	Book, Online Sources

Improvement				
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-P	Prerequisite
Data Structures and Algorithms	BCTI2306	Theory +Practice	4-2-0	Nil

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	

1. **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.

2. **Reference**
E-content:
LMS Text
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

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 4Hrs.+2Hrs.)				
Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples) String processing.	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	6+4	Lecture +PPT+Lab practice	Assignment	Book,Online,SLM

(advantages), writing recursive programs – Binomial coefficient, Fibonacci, GCD				
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			

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
Introduction to Web Technology	BCTI2307	Theory & Lab	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,BillKarow- Wiley Publishing Inc, 2010.

2. HTML Black Book by Steven Holzner2011

3. Web Design with HTML, CSS, JavaScript and jQuerySetbyJonDuckett.

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 unorderedlist.

3. Use CSS in the above webpage

4. Design a web page for a companyXYZ

5. Develop a static web page that shows basicanimation

6. Develop a web page for an audiocompany

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 thecompany.

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

11. Create a dynamic web page for acollege

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,Online Sources,SLM
Web application - Client-server, Web development Technologies- Html, CSS, Js, XML, Servlet & JSP, PHP and Ajax.	3	Class Room Teaching+ PPT	Assignment	Book,Online Sources,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 tag, List tag	3+4	Class Room Teaching+ PPT+Practical	Assignment	Book,Online Sources,SLM
Frame tag, Divtag ; Html forms - Input type, Text area, Select , Button.	3+4	Class Room Teaching+ PPT+Practical	Assignment	Book,Online Sources,SLM
Module III (Total Theory = 5 Hours / Practical= 7 Hours)				
Introduction to CSS, Syntax, Selectors	2+3	Class Room Teaching+ PPT+Practical	Assignment	Book,Online Sources,SLM
Embedding CSS to Html, Formatting fonts, Text & background colour, Borders & boxing.	3+4	Class Room Teaching+ PPT+Practical	Assignment	Book,Online Sources,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,Online Sources,SLM
	2	PPT+Practical		

Operators, Conditional statements, Looping statements, Strings, Arrays, Math Object,Date Object, Functions,Objects	2+5	Class Room Teaching+ PPT+Practical	Assignment	Book,Online Sources,SLM
Event Handling	2+2	Class Room Teaching+ PPT	Assignment	Book,Online Sources,SLM
Module-V (Total Theory= 3 Hour/ Practical = 1 Hour)				
Introduction to XML, Difference b/w Html & XML	3+1	Lecture	Assignment	Book,Online Sources,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,Online Sources,SLM
Module-VII (Total Theory= 4 Hour/ Practical = 0 Hour)				
XML Schema, XML DOM	4	Class Room Teaching+ PPT+Practical	Assignment	Book,Online Sources,SLM
Total (hrs)	Total = 57 Hours (Theory 33 Hours + Practical 24 Hours)			

Course Title	Code	Type of course	T-P-PJ	Prerequisite
Ethical Hacking Fundamentals	CCCS0411	Theory & Lab	4-2-0	Basic concepts of information security, Knowledge of computer networking, operating systems and servers

Objective

- To help students understand how ethical hacking is used as a method to prevent hacking.

- To make it possible for students to learn the process of identifying vulnerabilities and exploits of the technological ecosystem comprising of various hardware, software, network, OS and applications and identify suitable countermeasures.

- To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing.

Learning Outcome:

- Differentiate the processes of vulnerability assessment and ethical hacking from penetration testing.

- Justify the need for meticulous documentation in writing reports for consumption of both technical and management audiences.

- Articulate the rationale for having an adequate legal framework for dealing with hacking and ethical hacking

Evaluation System

Internal Examination	Component	% of Marks	Method of Assessment
	Internal Theory	20	Written examination
	Internal Practice	30(20+10)	Lab work + Learning Record
External Examination	External Theory	30	Written examination
	External Practice	20	Lab work

Total		*100*	

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Course outline

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Module I: Introduction to Ethical Hacking   (8Hours) Theory

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

Practice

1. Passive Reconnaissance using "Who is" and Onlinetools
2. Active Reconnaissance using "Samspade" and web sitedetails

Module II: Hacking Methodology   (10 Hours) Theory

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

Practice:

3. Full Scan, half Open Scan and Stealth scan using"nmap"
4. UDP and Ping Scanning using "Advance Lan Scanner" and"Superscan"

Module III: Network Hacking (5 Hours) Theory

Network Hacking: Hacking Wireless Networking, Evading IDS and Firewalls: Evading IDS and Firewalls.

Practice:

5. Packet crafting using "Packet creator"tools.
6. Creating and Analyzing spoofedemails.

Module IV:Web Hacking (5 Hours) Theory

 SQL Injection, Viruses, Worms and Physical Security: Viruses and Worms,PhysicalSecurity.Linuxhacking:Linuxhacking.

Practice:

7.   Perform user system surveillance and write a mitigation report on thesame

Module V:Report Writing (4 Hours) Theory

Report writing: Introduction to Report Writing, requirements for low level reporting & high level reporting of Penetration testing results.

Practice:

8. Examples on Reportwriting

ModuleVI:Mitigation (4 Hours)

Theory

Mitigation: Mitigation, Demonstration of vulnerabilities and Mitigation of issues identified including tracking.

Practice:

9. Exploiting NetBIOSvulnerability
10. Password Revelation from browsers and social networkingapplication

Module VII: Ethical Hacking andLegalSystem (6 Hours) Theory

Ethical Hacking and Legal System: 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.

Practice:

11. Case studies on Legal issues.

E-content: LMS Content

Text Books:

12. 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^{rd}ed (1 July2017).
13. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June2016).
14. 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).
15. An Ethical Guide to WI-FI Hacking and Security by SwaroopYermalkar, BecomeShakespeare.com; First edition (15 August2014).
16. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | KentBackman

| James Corley, Cengage India 1st edition (2016.

Online Source:

1. http://hack-o-crack.blogspot.in/2010/12/ethical-hacking-terminology.html
2. https://www.sans.org/reading-room/whitepapers/hackers/shades-ethical-hacking-black- white-gray1390
3. http://threesec.com/uncategorized/the-five-stages-of-ethical-hacking
4. http://news.hitb.org/content/footprinting-basics-hacking
5. https://www.owasp.org/index.php/Top_10_2013-Top_10
6. http://www.cybersecurity.my/data/content_files/13/72.pdf
7. https://www.offensive-security.com/reports/sample-penetration-testing-report.pdf

Session Plan

Topic coverage and Internal Test	No. of Sessions (in hrs.)	Activity	Assignment	Suggested Reading
Module-I [8hrs. Lecture + 10hrs. Practice]				
Introduction to Ethical Hacking: Hacking Methodology, Process of Malicious Hacking, and Foot printing and scanning: Foot printing, scanning.	4	Lecture	Assignment	Book,OnlineSources,SLM
Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques	4	Lecture	Assignment	Book,OnlineSources,SLM
Perform network scan to revile active hosts, open ports and services running. Perform privilege escalation attack on Client operating system and gain control of a Client, Operating system and write a short note on its mitigation strategy.	10	Practice	Assignment	
Module II [8hrs. Lecture + 10hrs. Practice]				
Hacking Methodology: Denial of Service, Sniffers, Session	4	Lecture	Assignment	Book,OnlineSources,SL

Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers.				M
Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques..	4	Lecture	Assignment	Book,OnlineSources,SLM
Demonstrate ARP Poisoning and detect ARP Poisoning in switch-based network.Perform man-in-the-middle attack and hijack an established session of a user. Write a report on the same with mitigation strategy	10	Practice	Assignment	
Module-III [6 hrs. Lecture + 5hrs. Practice]				
Network Hacking: Hacking Wireless Networking. Evading IDS and Firewalls: Evading IDS and Firewalls.	6	Lecture	Assignment	Book,OnlineSources,SLM
Crack FTP credentials using dictionary attack and write a report of possible suggestion on hardening the login services.	5	Practice	Assignment	
Module-IV [5hrs. Lecture + 4hrs. Practice]				
Web Hacking: SQL Injection, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. .	5	Lecture	Assignment	Book,OnlineSources,SLM

Perform user system surveillance and write a mitigation report on the same	4	Practice	Assignment	
Module-V[4hrs. Lecture + 4hrs. Practice]				
Report Writing: Introduction to Report Writing, requirements for low level reporting & high level reporting of Penetration testing results.	4	Lecture	Assignment	Book,OnlineSources,SLM
Examples on Report writing	4	Practice	Assignment	
Module-VI [5 hrs. Lecture + 5hrs. Practice]				
Mitigation: Mitigation, Demonstration of vulnerabilities and Mitigation of issues identified including tracking.	5	Lecture	Assignment	Book,OnlineSources,SLM
Exploiting NetBIOS vulnerability and password revelation from browsers and social networking application using Key Logger and Trojan Perform denial service attack on a server operating system and write a report on the same with	5	Practice	Assignment	
Module VII[6hrs. Lecture + 4hrs. Practice]				
Ethical Hacking and Legal System: Overview of India's Information Technology Amendment Act 2008 (IT Act	2	Lecture	Assignment	Book,OnlineSources,SLM
Hacker vs Cracker, liabilities - civil and penal, cyber theft and IPC sec 378, IT Act 2008 - sections43,65 and 66, how to file a complaint of suspected	2	Lecture	Assignment	Book,OnlineSources,SLM
Case Studies, understanding how hacking is legally dealt with among BRICS countries	2	Lecture	Assignment	Book,OnlineSources,SLM
Case studies on Legal issues.	4	Practice	Assignment	

Total (hrs)	84	42 hrs. Lecture + 42 hrs. Practice		

JAVA Programming

Subject Name	Code	Type of course	T-P-PJ	Prerequisite
JAVA Programming	BCTI2407	Theory & Lab	4-2-0	NIL

Objective

- Understand object oriented programming approach.
- Understand different programming constructs of Java language and apply them.

Learning outcome

- Students will able to differentiate between object oriented programming and function oriented programming approach
- Students will able to apply object oriented principles using Java programming language.

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,	2	lecture	assignment	Book, Online

identifiers, Literals, comments, separators, Java Key words				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, source	Online
Operators: Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence	2	lecture	Assignments, experiments	Book, source	Online
Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements	2	Lecture,	Assignment, experiments	Book, source	Online
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, source	Online

Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments.	2	Lecture,	Assignment, experiments	Book, source	Online
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, source	Online
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, source	Online

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,	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**		

Virtualization and Cloud Security

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

Objective

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

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.

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	

Course Outline

Module-I: Basics of Virtualization   **(7 Lectures)**

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   **(7 Lectures)**

Introduction to Virtualization & Cloud

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

Module III   **(8 Lectures)**

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

Module IV   **(7 Lectures)**

Cloud Security

Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol

Module V   **(7 Lectures)**

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

Module VI   **(8 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 VII   **(8 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, Requirements of Security as a Service (SaaS) model and Top Security threats to the cloud model

Reference
  E-content: LMS Content

Text Books:

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

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*

2.   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 7 Hrs				
Basics of Virtualization, Virtualization Technologies, Understanding Virtualization Uses.	3	Lecture	Assignment	Book, Online source
Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between Guest instances, Security between Hosts and Guests	4	Lecture	Assignment	Book, Online source
Module II : Total 7 Hrs				
Virtualization and Cloud computing concepts, Private cloud Vs Public cloud, IAAS, PAAS & SAAS	7	Lecture	Assignment	Book,Online,SLM

concepts				
Module III : Total 8 Hrs				
Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between Guest instances, Security between Hosts and Guests	8	Lecture	Assignment	Book,Online,SLM
Module IV : Total 7 Hrs				
Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol	7	Lecture	Assignment	Book,Online,SLM
Module V : Total 7 Hrs				
Cloud Controls Matrix. Complete Certificate of Cloud Security Knowledge (CCSK).	7	Lecture	Assignment	Book,Online,SLM
Module VI : Total 8 Hrs				
Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Concepts, Security, Privacy & Compliance aspects of cloud	8	Lecture	Assignment	Book,Online,SLM
Module VII : Total 8 Hrs				

Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model, Requirements of Security as a Service (SaaS) model and Top Security threats to the cloud model	8	Lecture	Assignment	Book,Online,SLM
Total (hrs.): 52 Hours (Theory)				

FCHU0213   LIFE SKILLS DEVELOPMENT-I [Aptitude & Reasoning]

Pre - requisites	Course Type	Credits
Nil	Practice	2

OBJECTIVES

- To provide ample opportunities for practice.
- To make the students solve each & every question within 30-40 seconds.
- To make the students visit all the questions in any exam.
- To make them learn the art of skipping questions which require more time.
- To make the students eligible to score 70% or more in each written tests.

OUTCOMES

- Quantitative Ability skills will be increased.
- Calculation & Logical thinking skills will be increased.
- Time spent per questions will be minimized.
- Students will be able to score minimum of 70%.
- Improved skills to qualify all competitive exams like Campus Written tests, Banking Exams, SSC Exams, Railway Exams, and GATE Exams.

MODULE I: (12 HOURS)

S. No.	Topic	Pedagogy	Details	Instructional Hrs			
				Th	Prac t	vide o	Pro j
1	Speed Math-1	Classroom Practice	Multiplication tricks, Square, cube, square root, Cube root tricks	0	1	0	0
2	Speed Math-2	Classroom Practice	Speed Calculations	0	1	0	0
3	Number System-01	Classroom Practice	Operation on Numbers, Classification of Numbers, Tests of Divisibility, Unit Digit Calculation	0	2	0	0
4	Number System-02	Classroom Practice	Factors & Factorials, Trailing Zeroes, Remainder Theorem	0	2	0	0
5	Series-1	Classroom	Arithmetic Progression,	0	2	0	0

6		Practice	Geometric Progression, Number series (Missing & Wrong)				
6	Series-2	Classroom Practice	Letter, Alpha numeric, Miscellaneous series	0	2	0	0
	Internal-I	**Online / Offline Test**	**Test & Discussion**	**0**	**2**	**0**	**0**

MODULE-2 (14 HOURS)

S. No.	Topic	Pedagogy	Details	Instructional Hrs			
				Th	**Pract**	**video**	**Proj**
	HCF & LCM	Classroom Practice	Concepts, short tricks, question discussion	0	3	0	0
	Average	Classroom Practice	Concepts, short tricks, question discussion	0	2	0	0
	Coding & Decoding	Classroom Practice	Letter Coding, Number coding, Message coding, Substitution coding, Conditional coding	0	3	0	0
	Word Problem	Classroom Practice	Analogy, Odd man out, word formation, letter pair	0	2	0	0
	Logical Thinking	Classroom Practice	Brain Riddles	0	2	0	0
	Internal-II	**Online / Offline Test**	**Test & Discussion**	**0**	**2**	**0**	**0**

EVALUATION SYSTEM: INTERNAL ASSESSMENT (50) + EXTERNAL ASSESSMENT (50)

Methods	Online/Offline Test-I	Online/Offline Test-II	Attendance	Assignment	% of Marks 50
Total	15	15	10	10	100

Designing Enterprise Network

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

Objective

> ☐ Understand switching techniques, and configuration of Cisco switches.
>
> ☐ Understand different routing protocols and configuration of Cisco routers.

Learning outcome

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

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	

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); PassiveInterface

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 - BasicCommands

2. Switch Configuration - Switch PortSecurity

3. Router - Configuration

4. Configuration of IP Address for aRouter

5. Setting up ofPasswords

6. PPPEncapsulation,PPPPAPAuthentication,PPPCHAPAuthentication

7. Configuration of Static and DynamicRouting

8. Configuration of DefaultRoute

9. Implementation ofEIGRP

10. Implementation ofOSPF

11. VLANConfiguration

12. SwitchTroubleshooting

13. Configuration of Access-lists - Standard &ExtendedACLs

14. Cisco Discovery Protocol

15. DHCP, DHCP Relay &DHCPExclusions

16. Configuring Logging to a Remote SyslogServer

2. 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

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 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	10+6	Lecture, lab practice		Book, Online source

Classfull IPv4 Networks, Analyzing Subnet Masks, Analyzing Existing Subnets				
MODULE-IV	**Lectures:6 hours**	**Lab:7 hours**		
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); Passive Interface	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			

Installation and Configuration of Server

Subject Name	Code	Type of course	T-P-P	Prerequisite
Installation and Configuration of Server	BCTI 3502	Theory & Lab	4-2-0	BCTI1106 Operating System

1. Objective

- Install and configure Windows Server2012.

- Configure virtual machine and storage.

2. 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	

3. 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.

4. 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

5. SessionPlan

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**			

Python Programming

Subject Name	Code	Type of course	T-P-P	Prerequisite
Python Programming	BCTI3505	Theory & Lab	4-2-0	

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

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

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	

1. 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.

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

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.

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.

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 buildRestapi for product

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

2. Reference

   E-Content: LMS

 Textbook:
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

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.)
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 **Iterating and Making Decisions:** Conditional programming, Looping, Putting this all together.	5+3	Lecture+ practice	Assignment	Book, Video, Online source
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 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	5+6	Lecture + practice	Assignment	Book, Video, Online source
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	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 trace back, Using the Python debugger, Inspecting log files, other techniques, troubleshooting guidelines	9+6	Lecture + practice	Assignment	Book, Video, Online source
Total (hrs)	**45+30 Hrs**			

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.

5. 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 SomasundaramGnanasundaramAlokShrivastava

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

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 Sessio n s (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, 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.	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	10	Lecture	Assignment	EBook, Class Note, Online Source
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,	10	Lecture	Assignment	EBook, Class Note, Online Source
Module-VII : Total 10 Hrs				
Data Center Clusters: **Cluster Architecture:** Asymmetric Two-Node	10	Lecture	Assignment	EBook, Class Note, Online Source

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.				
Total (hrs)	52 hrs			

LOGICAL REASONING & THINKING CREDIT 2 (2-0-0)

Subject Name	Code	Type of course	T-P-P	Prerequisite
LOGICAL REASONING & THINKING	BCTI3507	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	

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	

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: What is a GD?

- Types of GD
- Essentials of a GD
- Skills assessed during GD.

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

- Doubt clearing sessions on GD
- Practice sessions on GD
- Structure of a GD

LAB-3: Format of GD

- GD as used in national level recruitment boards
- Differences between a GD and a 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

- One to one, many to one, 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

- Practicing how to be professional and formal in approach
- Formal language to be used during presentation

LAB-10: Body language and Grooming

- Practising 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

Subject Name	Code	Type of course	T-P-PJ	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 Management Process.

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, the IT Financial Management Process, Introduction to ISO 2000 Standards	7	Lecture +PPT	Assignment	Book,OnlineSource ,SLM
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	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	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 & Lab	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.

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,	6+3	Lecture+ practice	Assignment	Book, Video, Online source

Understanding Private-Sector Investigations.				
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
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, conducting cloud investigation..COMPUTER FORENSICS AND INVESTIGATION LAB	10+7	Lecture+ practice	Assignment	Book, Video, Online source
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	6+5			
Total (hrs)	54 +45			

Cloud Infrastructure Solutions

Subject Name	Code	Type of course	T-P-P	Prerequisite
Cloud Infrastructure Solutions	BCTI3607	Theory & Lab	4-2-0	Information Security Fundamental

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 2008 R2

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

4. Create a custom VM and Capture the image

5. Create a vm from a captured image

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

7. Create and publish / host a webpage in windows azure

8. Create a website using Visual studio

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

10. test basic sql commands on the table created in the previous step.

11. Migrate an on premise DB to Azure

12. Create a storage account in Azure

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 SjoukjeZaal

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 SjoukjeZaal	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, Implement recovery services.	10+9	Lecture+ practice	Assignment	Book, Video, Online source
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				
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	BCTI3608	Theory	3-0-0	

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	