KUMAUN UNIVERSITY NAINITAL

DRAFT

National Education Policy-2020

Common Minimum Syllabus for
All Uttarakhand StateUniversities andColleges

Four Year Undergraduate Programme with Honours

SUBJECT: I.T.

INFORMATION TECHNOLOGY DEPARTMENT

EXPERT/SYLLABUS PREPARATION COMMITTEE

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LIST OF ALL PAPERS (DSC and DSE) WITH SEMESTERWISE TITLES IN INFORMATION TECHNOLOGY

YEAR	SEMESTER	COURSE	PAPER TITLE	THEORY/ PRACTICAL	CREDITS
UNDERGRADUATE CERTIFICATE IN INFORMATION TECHNOLOGY					
FIRST YEAR	I	I.T. DSC-1	FUNDAMENTALS OF INFORMATION TECHNOLOGY	THEORY	3
		I.T. DSC-1P	MS OFFICE LAB	PRACTICAL	1
	II	I.T. DSC-2	PROGRAMMING WITH 'C'	THEORY	3
		I.T. DSC-2P	'C' PROGRAMMING LAB	PRACTICAL	1
UNDERGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY					
SECOND YEAR	III	I.T. DSC-3	DATA STRUCTURES	THEORY	3
		I.T. DSC-3P	DATA STRUCTURE LAB	PRACTICAL	1
		I.T. DSE-1	COMPUTER SYSTEM ARCHITECTURE	THEORY	4
	IV	I.T. DSC-4	OBJECT ORIENTED PROGRAMMING	THEORY	3
		I.T. DSC-4P	OBJECT ORIENTED PROGRAMMING LAB	PRACTICAL	1
		I.T. DSE-2	DATABASE MANAGEMENT SYSTEM	THEORY	4
BACHELOR OF INFORMATION TECHNOLOGY					
THIRD YEAR	V	I.T. DSC-5	OPERATING SYSTEM	THEORY	3
		I.T. DSC-5P	DOS AND WINDOWS LAB	PRACTICAL	1
		I.T. DSE-3	PROGRAMMING WITH HTML AND JAVA SCRIPT	THEORY	4
	VI	I.T. DSC-6	CORE JAVA PROGRAMMING	THEORY	3
		I.T. DSC-6P	CORE JAVA LAB	PRACTICAL	1
		I.T. DSE-4	INTRODUCTION TO DIGITAL FORENSICS	THEORY	4
BACHELOR OF INFORMATION TECHNOLOGY WITH HONOURS					
	VII	I.T. DSC-7	PROGRAMMING WITH PYTHON	THEORY	4
		I.T. DSE-5	DISCRETE MATHEMATICS	THEORY	4

FOURTH YEAR		I.T. DSE-6	MANAGEMENT INFORMATION SYSTEM	THEORY	4
		I.T. DSE-7	PYTHON LAB	PRACTICAL	4
			ACADEMIC PROJECT/ ENTERPRENURESHIP		6
	VIII	I.T. DSC-8	ADVANCED WEB DESIGNING	THEORY	4
		I.T. DSE-8	RESEARCH METHODOLOGY	THEORY	4
		I.T. DSE-9	WEB DESIGNING WITH DHTML AND PHP	PRACTICAL	4
		I.T. DSE-10	DATA WAREHOUSING AND DATA MINING	THEORY	4
			ACADEMIC PROJECT/ ENTERPRENURESHIP		6

Abbreviations:

DSC: Discipline Specific Course ***DSE: Discipline Specific Electives***

NOTE: NUMBER OF SEATS FOR STUDENTS FROM OTHER FACULTIES IN THEIR RESPECTIVE COURSES SHALLBE DECIDED BYTHE CONCERNEDFACULTYMEMBERSATTHETIMEOFADMISSION.

Program Outcomes (POs) (Undergraduate Program)

- Students will have a firm foundation in the fundamentals and applications of Computer and its uses.
- Students will develop skills in problem solving and programming.
- Students will be able to explore new directions to pursue higher studies in computer education.
- Students will be able to contest and qualify different competitive exams where computer knowledge is essential.
- Students will be able to work as programmer, tester, and web designer etc.

Program Specific Outcomes (PSOs) (Undergraduate Program)

- Develop a strong foundation in computer fundamentals, including hardware, software, and operating systems, enabling students to understand and operate various computing environments effectively.
- Understand and design digital systems and computer architectures, providing a solid foundation in the principles and practices of hardware and system-level design.
- Gain proficiency in C, C++, Java and PYTHON programming and problem-solving techniques, allowing students to design, implement, and test algorithms to solve real-world problems.
- Gain expertise in data structures, enhancing the ability to organize, manage, and analyze data efficiently for optimized performance in computational tasks.
- Understand the fundamental concepts and functionalities of operating systems, including process management, memory management, and file systems, ensuring effective system-level programming and administration.

SEMESTER - I

I.T. DSC-1:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-1	03	-	-	-	Passed Class XII with Maths	Nil

UNDERGRADUATECERTIFICATEININFORMATION TECHNOLOGY		
FIRST YEAR	**SEMESTER:FIRST**	**COURSE:I.T.DSC-1**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: FUNDAMENTALS OF INFORMATION TECHNOLOGY (THEORY)		
CREDITS: 03	**NO OF LECTURES:**	

Course Outcomes: This course will help to initiate a relative beginner into the Information gathering, storage, processing, retrieval and Hardware: Processor, input/ output devices, storage devices & media. Data communication equipment. Software: System & Application. Machine Language, Assembly Language, High level language, Low level language, Generation of Computer language, Operating System.

UNIT	TOPICS	NO OF LAB LECTURES
I	**Information: Concept of information and information processing; Information gathering, storage, processing, retrieval, and dissemination; Evaluation of information processing. Elements of modern information processing system.**	**12**
II	**Hardware: Processor, input/ output devices, storage devices & media. Data communication equipment. Software: System & Application.**	**12**
III	**Machine Language, Assembly Language, High level language, Low level language, Generation of Computer language, Operating System, Major function, Task function.**	**12**
IV	**Data communication networks, Computer network LAN, MAN, WAN, Client Server Architecture, Network Structure, Communication service across network.**	**12**
V	**Integrity definition, Enduring integrity, Computer and communication security, Concept of security, Preventive measures and treatment**	**12**

SUGGESTED READINGS:

Computer fundamentals by Pradeep k. Sinha

Computer today by Sumitabha Das

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation of students. Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline and Participation in Different Activities)

Suggested Equivalent Online Courses: SWAYAM

SEMESTER - I

I.T. DSC-1P: PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-1P	01	-	-	-	Passed Class XII with Maths	Nil

UNDERGRADUATECERTIFICATEININFORMATION TECHNOLOGY		
FIRST YEAR	**SEMESTER:FIRST**	**COURSE:I.T.DSC-1P**
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE: MS OFFICE LAB (PRACTICAL)		
CREDITS: 01	**NO OF LAB LECTURES:**	
Course Outcome: The student will be able to work in organization with MS office.		

UNIT	TOPICS	NO. OF LAB LECTURES
I	Create a news-paper document with at least 200 words. Use margins. Create a Mathematical question paper using, at least five equations.	12
II	Create a flowchart using proper shapes like ellipse, arrows, rectangle, and parallelogram. Use grouping to group all the parts of the flowchart into one single object.	12
III	Create a table using table menu.	12
IV	Create a table "Student Result" with Division Declaration.	12
V	Create a power-point presentation with minimum 5 slides.	12

SUGGESTED READINGS:

Computer fundamentals by Pradeep k. Sinha

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation of students. Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline and Participation in Different Activities)

Suggested Equivalent Online Courses: SWAYAM,MOOCS,

SEMESTER - II

I.T. DSC-2: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-2	03	-	-	-	Passed Class XII with Maths	Nil

UNDERGRADUATE CERTIFICATE IN INFORMATION TECHNOLOGY		
FIRST YEAR	SEMESTER:SECOND	COURSE:I.T.DSC-2
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: PROGRAMMING WITH 'C'		
CREDITS: 03	NO OF LAB LECTURES:	

Course Outcome: The students will engage in theoretical and analytical studies of a C, Program and program structure, Compiling and Executing C Program. Functions, Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C.

UNIT	TOPICS	NO OF LAB LECTURES
I	Evolution of Programming methodologies, Introduction to Procedure oriented programming and its basic features, Basic components of a C, Program and program structure, Compiling and Executing C Program. Selection control statements in C.	15
II	Data types, Expression and control statements Iteration statements in C, Loops: For loop, While loop, Do-while loop	15
III	Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions.	15
IV	Functions, Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C.	15

SUGGESTEDREADINGS:

Programming in ANSI C by Balagurusamy

Let us C by Yashwant Kanetker.

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation of students. Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline and Participation in Different Activities)

Suggested Equivalent Online Courses: SWAYAM,MOOCS,

SEMESTER - II

I.T. DSC-2P: PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites ofthecourse (ifany)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-2P	01	-	-	-	Passed Class XII with Maths	Nil

UNDERGRADUATECERTIFICATEIN INFORMATION TECHNOLOGY		
FIRST YEAR	SEMESTER:SECOND	COURSE:I.T.DSC-2P
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE: 'C' PROGRAMMING LAB (PRACTICAL)		
CREDITS: 01	NO OF LAB LECTURES:	
Course Outcome: Students will learn to do programming with C.		

UNIT	TOPICS	NO. OF LABLECTURES
I	Program based on Rules of C programming Program on Structure of C program Program on C Data types (Basic, Derived, User defined)	15
II	Program on Console I/O Statements Programs to perform various calculations. Operators, Programs to implement various operators	15
III	Program on Conditional Control Statements If-else , switch-case Loops: While, do while, for Implementing programs on conditional & loops break, continue, goto keywords	15
IV	Programs on Arrays Declaration, accessing array data Implementation of array operations Programs on Function and its types, call by value, call by reference and recursion	15

SUGGESTED READINGS:

Let us C by Yashwant Kanetker

Programming in ANSI C by Balagurusamy

SuggestedEquivalentOnlineCourses:SWAYAM,MOOCS

SEMESTER - III

I.T. DSC-3: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites ofthecourse (ifany)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-3	**03**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATECERTIFICATEIN INFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:THIRD**	**COURSE:I.T.DSC-3**
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE:DATA STRUCTURES(THEORY)		
CREDITS: 03	**NO OF LAB LECTURES:**	

Course Outcome: The objective of this course is to familiarize students with fundamental data structures and their applications in solving computational problems. The course aims to develop students' skills in designing, implementing, and analysing various data structures.

UNIT	TOPICS	NO. OF LABLECTURES
I	Basic concepts- Data types, Abstract Data Types, Data structure definition and applications. Algorithms Performance analysis (time complexity and space complexity basic introduction). Representation of Arrays (Linear and multi dimensional) in Memory, Insertion and Deletion in linear and 2D arrays, Pointers, passing pointers to functions, pointer to array, self referential structures.	**12**
II	Linked Lists: Introduction, Representation of Linear linked Lists in Memory, Traversing a Linear Linked List, Searching item in Linear Linked List. Creation, insertion, Deletion and searching in Doubly (Two-Way) and Circular Linked List.	**12**
III	Introduction to Stacks, Array and linked list Representation of Stacks, Application of Stacks, Arithmetic Expressions (Polish Notation), applications- infix to postfix conversion. Queues: Applications of queues, FIFO structure (linear queue), Priority Queues, Circular Queues, Double ended Queues, operations on Queues (Insertion, Deletion, Searching, Display, etc.)	**12**
IV	Tree: Basic Terminology, Binary tree, array and linked representations of tree, traversals (in order, preorder, postorder), Binary Search Tree, Operations- Searching, Insertion and Deletion, threaded binary trees, AVL Trees, Graphs: Introduction, Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multi lists, Graphs traversals- DFS and BFS. Hashing: Introduction, hash tables, hash functions, collision resolution methods.	**12**
V	Searching and Sorting: Linear Search, Binary Search, Sorting: Bubble Sort, Insertion Sort, Selection Sort, Heap Sort, Radix Sort, Quick Sort and Merge sort.	**12**

SUGGESTED READINGS:

"Data Structures and Algorithms in Java" by Robert Lafore.

"Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, R. L. Rivest, and C. Stein.

SEMESTER - III

I.T. DSC-3P: PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites ofthecourse (ifany)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-3P	**01**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATECERTIFICATEIN INFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:SECOND**	**COURSE:I.T.DSC-3P**
SUBJECT: INFORMATION TECHNOLOGY		
PAPERTITLE: DATA STRUCTURE LAB(PRACTICAL)		
CREDITS: 01	**NO OF LAB LECTURES:**	
Course Outcome: : By the end of this course, students should be able for various programs in data structure		

UNIT	TOPICS	NO. OF LAB LECTURES
I	Program on: Stack Operations, Queue and Queue using Linked List.	15
II	Reading/Writing and Sorting/Searching Students records from Files	10
III	Recursive programs: Factorial, Fibonacci, GCD	10
IV	File Base Search, linear search, binary search	10
V	Sorting: Bubble sort, insertion sort, selection sort, heap sort, radix sort, quick sort and merge sort.	15

SUGGESTED READINGS:

"Data Structures and Algorithms in Java" by Robert Lafore.

Suggested Continuous Evaluation Methods:

Assignment/Practical/VivaVoce/Test/Quiz(MCQ)/Seminar/Presentations/Researchorientationof students.OverallperformancethroughouttheSemester(includesAttendance,Behaviour,DisciplineandParticipationin Different Activities)

Suggested Equivalent Online Courses: SWAYAM,MOOCS

SEMESTER - III

I.T. DSE-3: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites ofthecourse (ifany)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-3	04	-	-	-	Diploma in I.T.	Nil

BACHELOR OF INFORAMTION TECHNOLOGY		
SECOND YEAR	**SEMESTER:FIFTH**	**COURSE:I.T.DSE-3**
SUBJECT :INFORAMTION TECHNOLOGY		
PAPER TITLE:COMPUTER SYSTEM ARCHITECTURE (THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

UNIT	TOPICS	NO OF LAB LECTURES
I	Register Transfer and Microoperations: Components of a computer system, Von Neumannarchitecture,ComputerSystemInterconnection,RegisterTransferLanguage, RegisterTransfer,Micro-operations–Arithmetic,LogicandShift.	15
II	Central Processing Unit: Computer Arithmetic– ALU, Integer Representation and Arithmetic, Floating-Point Representation and Arithmetic, Decimal Arithmetic. CPU Control Unit, Instruction Set Architecture– Addressing Modes and Design, CISC and RISCparadigm.	15
III	The 8086 microprocessor: Introduction to 8086 – Microprocessor architecture – Addressing modes, Instruction set and assembler directives- 8086 signals – Basic configurations– System bustiming –System designusing8086-System.	15
IV	Parallel Processing concepts: Instruction level parallelism, Parallel processing challenges,Flynn'sclassification,Pipelining,VectorProcessing,Superscalarprocessors, Multi-core Processors– Multithreading, Multicore processor Architecture.	15

SUGGESTED READINGS:

M.MorrisMano,"ComputerSystemArchitecture".

Suggested Continuous Evaluation Methods:

Assignment/Practical/VivaVoce/Test/Quiz(MCQ)/Seminar/Presentations/Researchorientationofstudents.Overallperformancethroughouttheseme ster(includesAttendance,Behaviour,Disciplineand ParticipationinDifferentActivities)

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

SEMESTER - IV

I.T. DSC-4: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-4	**03**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:FOURTH**	**COURSE:I.T.DSC-4**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: OBJECT ORIENTED PROGRAMMING(THEORY)		
CREDITS: 03	**NO OF LAB LECTURES:**	
Course Outcome: Student will learn the concept, features, arrays, function of programming language C++		

UNIT	TOPICS	NO OF LAB LECTURES
I	Evolution of Programming methodologies, Introduction to OOP and its basic features, Basic components of a C++, Program and program structure, Compiling and Executing C++ Program. Selection control statements in C++.	**12**
II	Data types, Expression and control statements Iteration statements in C++ Control statements: if-else, else-if clause, switch, break and continue statement. Loops: for loop, while loop, do-while loop	**12**
III	Introduction to Arrays, Multidimensional Arrays, Strings and String related Library Functions. Functions, Passing Data to Functions, Scope and Visibility of variables in Functions, Structures in C++.	**12**
IV	Creating classes and Abstraction: Classes objects, data members, member functions, this Pointer, Friends, Friend Functions, Friend Classes, Friend Scope, and Static Functions.	**12**
V	Constructors and Destructors, Static variables and Functions in class. Inheritance in C++, Types of Inheritance, Pointers, Objects and Pointers, Multiple Inheritance.	**12**

SUGGESTED READINGS:

BjarneStroustrup,"TheC++ProgrammingLanguage".
E.Balagurusamy,"ObjectOrientedProgrammingwithC++".

SEMESTER - IV

I.T. DSC-4P: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-4P	**01**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:THIRD**	**COURSE:I.T.DSE-4P**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: OBJECT ORIENTED PROGRAMMING LAB(PRACTICAL)		
CREDITS: 01	**NO OF LAB LECTURES:**	
Course Outcome: Student will learn the coding of programming language C++		

UNIT	TOPICS	NO OF LABLECTURES
I	**Programs based on Comparison, even no, prime no. and various statements.**	**12**
II	**Programs based on Loop: For, While and Do-while**	**12**
III	**Programs based on Arrays**	**12**
IV	**Programs based on Functions**	**12**
V	**Programs based on Classes, Inheritance and Function Overloading**	**12**

SUGGESTED READINGS:

BjarneStroustrup,"TheC++ProgrammingLanguage".
E.Balagurusamy,"ObjectOrientedProgrammingwithC++".

SEMESTER - IV

I.T. DSE-2: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any))
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-2	**04**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:FOURTH**	**COURSE:I.T.DSE-2**
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE: DATABASE MANAGEMENT SYSTEM (THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: By the end of this course, students should be able to understand the concepts and principles of database management systems. Design and create relational databases using SQL.Query and manipulate data using SQL commands. Apply normalization techniques to ensure data integrity.Understand the principles of database administration and security.

UNIT	TOPICS	NO OF LABLECTURES
I	Introduction to Database Management System Overview of database systems and their components, Data models: hierarchical, network, relational, and object-oriented, Relational database concepts: tables, tuples, attributes, keys, etc.	**15**
II	Entity-Relationship Diagrams and Normalization Entity-Relationship (ER) modeling, Functional dependencies and normalization, Normal forms: 1NF, 2NF, 3NF, BCNF	**15**
III	Query Languages and Transactions SQL fundamentals: SELECT, INSERT, UPDATE, DELETE, Joins and subqueries, ACID properties and transaction management.	**15**
IV	Indexing and Concurrency Control Indexing techniques: B-trees, hash indexes, etc., Concurrency control methods: locking, timestamping, etc., Database recovery and backup strategies.	**15**

SUGGESTED READINGS:

"Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan.
"SQL Performance Explained" by Markus Winand.

SEMESTER - V

I.T. DSC-5: THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-5	03	-	-	-	Diplomain I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER:FIFTH**	**COURSE:I.T.DSC-5**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: OPERATING SYSTEM (THEORY)		
CREDITS: 03	**NO OF LAB LECTURES:**	

Course Outcome: Students will undergo an intensive study of the essential part of the computer that is operating system. Process Control Block, Context switching – Threads – Concept of multithreads. Process Scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilizationDeadlocks: Definition, Deadlock characteristics, Deadlock Preventionetc

UNIT	TOPICS	NO OF LABLECTURES
I	Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Functions, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems.	15
II	Processes: Definition, Process Relationship, Process states, Process State transitions, Process Control Block, Context switching – Threads – Concept of multithreads. Process Scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only), Scheduling algorithms: Pre-emptive and Non, pre-emptive, FCFS – SJF – RR, Multiprocessor scheduling: Types, Performance evaluation of the scheduling.	15
III	Inter-process Communication: Race Conditions, Critical Section, Mutual Exclusion, Peterson's Solution, The Producer Consumer Problem, Semaphores, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.	15
IV	Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery.	15

SUGGESTED READINGS:

OPERATING SYSTEM BY Silberschatz, Galvin and Gagne

SEMESTER - V

I.T. DSC-5P: PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-5P	01	-	-	-	Diploma in I.T.	Nil

UNDERGRADUATEDIPLOMAININFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER:FIFTH**	**COURSE:I.T.DSC-5P**
SUBJECT: INFORMATION TECHNOLOGY		
PAPER TITLE:DOS AND WINDOWS LAB(PRACTICAL)		
CREDITS: 01	**NO OF LAB LECTURES:**	

Course Outcome: Students will study of various programs in DOS and Windows Operating System.

UNIT	TOPICS	NO OF LABLECTURES
I	Basic DOS Commands: Introduction to DOS, basic commands (e.g., DIR, CD, MD,RD,COPY,DELETE)	12
II	File Management: Creating, editing, and managing files using DOS commands	12
III	Directory Management: Creating, deleting, and managing directories using DOS	12
IV	Introduction to Windows: Overview of Windows operating system, basic components, and user interface File Management: Creating, editing, and managing files using Windows Explorer	12
V	Windows Troubleshooting Tools: Using tools like Event Viewer, Task Manager, and System Configuration to troubleshoot Windows issues	12

SUGGESTED READINGS:

Principles of operating systems by Naresh chauhan

Operating system concepts by Abraham Silberschatz

SEMESTER - V

I.T. DSE-1:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-1	**04**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATE DIPLOMA ININFORMMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER:THIRD**	**COURSE:I.T.DSE-1**
SUBJECT:INFORMATION TECHNOLOGY		
PROGRAMMING WITH HTML AND JAVA SCRIPT (THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: The students will engage in the practical knowledge of web designing with HTML. Features of HTML. Style Sheets: Need for CSS, Introduction to JavaScript: JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators, Control Structures, Conditional Statements, Loop Statements, Object-Based Programming.

UNIT	TOPICS	NO OF LAB LECTURES
I	Introduction to Computer Networks: Network definition; Network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite. Backbone networks-repeaters, hubs, switches, bridges, router and gateways.	**15**
II	Networks Switching Techniques and Access mechanisms: Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.	**15**
III	Introduction to HTML: Basics of HTML, formatting and fonts, commenting code, hyperlink, lists, tables, images, forms, Meta tags, Character entities, frames and frame sets, Overview and features of HTML5. Style Sheets: Need for CSS, Introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3.	**15**
IV	Introduction to JavaScript: JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators, Control Structures, Conditional Statements, Loop Statements, Object-Based Programming, Functions, Executing Deferred Scripts, Objects, Message box in JavaScript, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events, Event Handlers, Forms, Forms Array.	**15**

SUGGESTED READINGS:

HTML and CSS: Design and build websites by Jon Duckett

SEMESTER - VI

I.T. DSC-6:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-6	03	-	-	-	Diploma in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER: SIXTH**	**COURSE:I.T.DSC-6**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: CORE JAVA PROGRAMMING(THEORY)		
CREDITS: 03	**NO OF LAB LECTURES:**	

UNIT	TOPICS	NO OF LAB LECTURES
I	Introduction, Evolution, features, comparison with C and C++;Java program structure; tokens, keywords, constants, variables, data, type casting, statements, Operators and Expression; Conditional Statements and Loop Statements.	12
II	Class: **S**yntax, instance variable, class variables, methods, constructors,overloading of constructors and methods. Arrays, Strings and Vectors.	12
III	Inheritance: Types of inheritance, use of super, method overriding, finalclass, abstract class, wrapper classes. Interface, Packages and visibility controls.	12
IV	Errors and Exceptions**:** Types of errors, Exception classes, Exceptionhandling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments.	12
V	Multithreaded Programming: Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication, Implementing the Runable Interface.	12

SUGGESTED READINGS:
Programming with Java by E Balagurusamy
Core java programming by Dr R Nageswara Rao

Suggested Continuous Evaluation Methods:
Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation ofstudents.Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline andParticipationin Different Activities)

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

SEMESTER - VI

I.T. DSC-6P: PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-6P	01	-	-	-	Diploma in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER: SIXTH**	**COURSE:I.T.DSC-6P**
SUBJECT: INFORMATION TECHNOLOGY		
PAPER TITLE : CORE JAVA LAB(PRACTICAL)		
CREDITS: 01	**NO OF LAB LECTURES:**	

Course Outcome: The students will learn to do programming with JAVA.

UNIT	TOPICS	NO OF LAB LECTURES
I	Students are required to implement object-oriented paradigm using JAVA. Below is the list of some of the experiments: Program on strings: Check the equality of two strings, Reverse of string. Sum and product of matrix.	15
II	Program using loops: to find the sum of digits of a given number, display a multiplication table, display all prime numbers between 1 to 100. Palindrome number, Armstrong number, Fibonacci sequence	16
III	Program to demonstrate all math class function. Program to demonstrate method over-riding and overloading ions.	15
IV	Programs on inheritances. Multithreaded program	14

SUGGESTED READINGS:

Programming with Java by E Balagurusamy

Suggested Continuous Evaluation Methods:

Assignment/Practical/VivaVoce/Test/Quiz(MCQ)/Seminar/Presentations/Researchorientationof students.OverallperformancethroughouttheSemester(includesAttendance,Behaviour,DisciplineandParticipationin Different Activities)

Suggested Equivalent Online Courses:SWAYAM,MOOCS

SEMESTER - VI

I.T. DSE-4:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-4	04	-	-	-	Diploma in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER: SIXTH**	**COURSE:I.T.DSE-4**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE:INTRODUCTION TO DIGITAL FORENSICS (THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: Students will study Introduction, Evolution, features,

UNIT	TOPICS	NO OF LAB LECTURES
I	An Overview of Digital Forensics, Preparing for Digital Investigations, Preparing A Digital Forensics Investigations, Procedure for Private Sector High-Tech investigations, understanding data recovery workstation and software, conducting and investigations.	12
II	Data Acquisition: Understanding storage formats for digital evidence, determining the best acquisition method, Contingency planning for Image acquisition, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools and other forensics acquisitions tools.	12
III	Digital Forensic Analysis and Validation: Data to collect and analyze, Validating Forensic data, Addressing data hiding techniques, Virtual Machine Forensics, Live Acquisition and Network Forensics.	12
IV	Email and Social Media Investigations: Role of Email in investigations, Roles of Client and server in Email, Investigating Emails Crimes and Violations, Email Servers, Specialize Email Forensic Tools, Digital Forensics to Social Media Communications.	12
V	Cloud Forensics: Cloud Computing, Legal Challenges in Cloud Forensics, Technical Challenges in Cloud Forensics, Acquisitions in the cloud, conducting a cloud investigation, Tools for Cloud Forensics.	12

SUGGESTED READINGS:

Edson J. A Brief History Of Forensic Sciences

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation ofstudents.Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline andParticipationin Different Activities)

SEMESTER - VII

I.T. DSC-7:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-7	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY WITH HONOURS

FOURTH YEAR	SEMESTER: SEVENTH	COURSE:I.T.DSC-7

SUBJECT:INFORMATION TECHNOLOGY

PAPERTITLE:PROGRAMMING WITH PYTHON(THEORY)

CREDITS: 4 | **NO OF LAB LECTURES:**

Course Outcome: Students will study Python programming language and Setting up path, working with Python, Basic Syntax, Variable and Data Types, Operator, Looping: For, While, Nested loops Control Statements: Break, Continue, and Pass etc.

UNIT	TOPICS	NO OF LAB LECTURES
I	Introduction: History Features, Setting up path, working with Python, Basic Syntax, Variable and Data Types, Operator.	12
II	Conditional Statements: If, if- else, nested if-else Looping: For, While, Nested loops Control Statements: Break, Continue, and Pass.	12
III	String Manipulation: Accessing Strings, Basic Operations, String slices, Function and Methods Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods Dictionaries: Introduction, Accessing values in dictionaries, working with dictionaries, Properties, Functions.	12
IV	Functions: Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.Modules: Importing module, Math module, Random module, Packages, Composition.	12
V	Input-Output: Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions Exception Handling: Exception, Exception Handling, except clause. Try-finally clause User Defined Exceptions.	12

SUGGESTED READINGS:

The Complete Reference Python by Martin C. Brown

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation ofstudents.Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline andParticipationin Different Activities)

SEMESTER - VII

I.T. DSE-5:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (If any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-5	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY WITH HONOURS		
FOURTH YEAR	SEMESTER: SEVENTH	COURSE:I.T.DSE-5
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE:DISCRETE MATHEMATICS (THEORY)		
CREDITS: 04	NO OF LAB LECTURES:	

CourseOutcome: By the end of this course, students should be able to demonstrate a strong understanding of fundamental mathematical concepts.Apply mathematical principles to solve problems related to I.T. Analyse and interpret mathematical models relevant to I.T. applications.

UNIT	TOPICS	NO OF LAB LECTURES
I	Sets, Relations, and Functions :Set theory and operations, Relations and functions: properties and types, Equivalence relations and partitions.	12
II	Mathematical logic: Logic operators, Truth tables, Theory of inference and deduction, mathematical calculus, predicate calculus, predicates and qualifiers.	12
III	Basic of counting, permutation combination, circular permutation, power set, basic identities, partition and cross partition, pigeonhole principle, Pascal triangle, binomial theorem, n-Ary operation, semi group, homomorphism and isomorphism of semi groups, monoid, Addition, multiplication Modulo m & p, property and postulates of group, cosets.	12
IV	Lattices & Boolean Algebra: Axiomatic definition of Boolean algebra as algebra as algebraic structures with two operations, basic results truth values and truth tables, the algebra of propositional functions, Boolean algebra of truth tables.	12
V	Graph, definition, incidence and degree, order of graph, sub-graph, removal and addition of vertex and edge, operation of graphs complement and connect of graph, cycle, path, wheel, bipartite graph, isomorphism, forest and operation, tree, spanning tree, rooted tree, binary tree, height balance binary tree, planar graph, Eulers graph and Hamiltonian graph, digraph.	12

SUGGESTED READINGS:

"Discrete Mathematics and Its Applications" by Kenneth H. Rosen.

"Linear Algebra and Its Applications" by David C. Lay

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation ofstudents.Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline andParticipationin Different Activities)

SEMESTER - VII

I.T. DSE-6:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-6	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY WITH HONOURS		
FOURTH YEAR	SEMESTER: SEVENTH	COURSE:I.T.DSE-6
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE:MANAGEMENT INFORMATION SYSTEM (THEORY)		
CREDITS: 04	NO OF LAB LECTURES:	

Course Outcome: By the end of this course, students should be able to demonstrate a strong understanding of fundamental mathematical concepts. Apply mathematical principles to solve problems related to I.T. Analyse and interpret mathematical models relevant to I.T. applications.

UNIT	TOPICS	NO OF LAB LECTURES
I	The meaning and role of MIS : What is MIS decision support systems, systems approach, the systems view of business, MIS organization within the company, Managers view of Information systems, Contemporary Approaches to information systems, How Information Systems Impact Organizations and Business Firms.	12
II	Conceptual system design: Define the problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs and select one, document the system concept, prepare the conceptual; design report. Organizing data and information: Datawarehouses , Datamart and datamining	12
III	Detailed system design: Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade off criteria, define the subsystems, sketch the detailed operating subsystems and information flows, determine the degree of automation of each operation, inform and involve the organization again, inputs, outputs ,and processing.	12
IV	Implementation, evaluation and maintenance of the MIS : Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files, test the system, cutover, document the system, evaluate the MIS, control and maintain the system.	12
V	Pitfalls in MIS development: Fundamental weaknesses, soft spots, in planning, design problems, implementation: the TAR PIT. Introduction to E-Commerce and E-Commerce challenges. An overview of ERP, Applications of information systems to business. Security and Ethical issues of information systems.	12

SUGGESTED READINGS:MIS by Ramesh Behl, James A. O'Brein, George M. Marakas

SEMESTER - VII

I.T. DSE-7:PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-7	04	-	-	-	Bachelor in I.T.	Nil

BACHELOROFINFORMATION TECHNOLOGY WITH HONORS		
FOURTH YEAR	**SEMESTER: SEVENTH**	**COURSE:I.T.DSE-7**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE:PYTHON LAB (PRACTICAL)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: Students will learn how to do programming with Python.

UNIT	TOPICS	NO OF LAB LECTURES
I	Write a program to demonstrate different number data types in Python.	5
II	Write a program to perform different Arithmetic Operations on numbers in Python.	5
III	Write a program to perform different String Operations.	5
IV	Write programs to showcase the python time library.	5
V	Write a program to demonstrate working with lists in python.	5
VI	Write a program to demonstrate working with tuples in python.	5
VII	Write a program to demonstrate working with dictionaries in python.	5
VIII	Write programs to demonstrate the uses of functions	5
IX	Demonstrate the use of *args, **kwargs in python.	5
X	Write Programs to showcase use of lambda functions.	5
XI	Write a python program to define a module and import a specific function in that module to another program.	5
XII	Demonstrate Exception Handling features of Python Demonstrate OOPs Capabilities of python language.	5

SUGGESTED READINGS: The Complete Reference Python by Martin C. Brown

SEMESTER - VIII

I.T. DSC-8:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSC-8	04	-	-	-	Bachelor in I.T.	Nil

BACHELOROFINFORMATION TECHNOLOGY WITH HONORS		
FOURTH YEAR	SEMESTER: EIGHTH	COURSE:I.T.DSC-8

SUBJECT:INFORMATION TECHNOLOGY

PAPER TITLE: ADVANCED WEB DESIGNING (THEORY)

CREDITS: 04 | **NO OF LAB LECTURES:**

CourseOutcome: By the end of this course, students should be able to understand the structure and components of a web page using HTML and PHP.

UNIT	TOPICS	NO OF LAB LECTURES
I	Introduction to World Wide Web and its work, Web Browsers, Search Engine, Downloading, Hyper Text Transfer Protocol (HTTP), URL, Web Servers, FTP, Web publishing- Domain Name Registration, Space on Host Server for Web Site, Maintain and Updating.	12
II	HTML: Elements of HTML & Syntax, Comments, Headings, Paragraph, Span, Pre Tags, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, div,Frames, Use of Forms in Web Pages. Introduction to Java Scripts, Objects in Java Script, and Dynamic HTML with Java Script.	12
III	CSS**:** Introduction to Cascading Style Sheets, Types of Style Sheets (Inline, Internal and External), using Id and Classes, CSS properties: Background Properties, Box Model Properties, Margin, Padding, List and BorderProperties.	12
IV	Programming in PHP: server side scripting language, HTML Embedding, comment, variables, basic data types, operators, Control Structures, Functions, passing variables between pages using URL, cookies and sessions, sending from data to the server.	12
V	Database programming with PHP: Syntax, Connecting to the Database inserting, deleting and editing records to/from the database, fetching from Database, Using tables to display data, saving HTML from data to database.	12

SUGGESTED READINGS:A handbook on web development by A Jashnani

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

SEMESTER - VIII

I.T. DSE-8:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-8	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
FOURTH YEAR	**SEMESTER: EIGHT**	**COURSE:I.T.DSE-8**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE:RESEARCH METHODOLOGY (THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: By the end of this course, students should be able to demonstrate a strong understanding of networking concepts.

UNIT	TOPICS	NO OF LAB LECTURES
I	Research – types, selection and formulation of research Problem – research Design. Analytical study of Statistical Method, Historical Research. Statistics as a tool of research, Methods and demerits of statistics. Surveys, types of research methods, Case Study, Sampling types and Methods. Historical Method and Scientific Method. Characteristic Features of Scientific Method; Empirical Verifiable, Cumulative, Self - Correcting, Deterministic. Ethical and Ideological neutrality (Value Free), Statistical Generalizability.	12
II	Collection, Objectives and Classification of Data, Types of data presentation. Data Interpretation, Primary, Secondary and Tertiary Data. Data organization in SPSS & Excel, Computer and Content Analysis. Discussion and Interpretation of results. Testing of Hypothesis: Logical and Statistical Techniques.	12
III	Locating Information on a Topic of Interest, Acquiring Copies of Articles of Interest. The Nature of Scientific Variables, Conceptual Versus Operational Definitions of Variables. Levels of Measurement, Various Paradigms. The Basic Format for a Research Report, Identification of the Parts of a Research Report. Citation and Referencing Styles. Essentials of Report Writing, Aids for Writing Good Research Report.	12

- **SUGGESTED READINGS:** Research Methodology: Techniques and Applications by K. Hanumantha Rao
- Bagchi, Kanak Kanti (2007) Research Methodology in Social Sciences: A Practical Guide, Delhi, Abijeet Publications.

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

SEMESTER - VIII

I.T. DSE-9:PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-9	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
FOURTH YEAR	**SEMESTER: EIGHT**	**COURSE:I.T.DSE-9**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: WEB DESIGNING WITH DHTML AND PHP LAB(PRACTICAL)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: By the end of this course, students should be able to create the various web sites.

UNIT	TOPICS	NO OF LAB LECTURES
I	Create a personal profile web page. Design a table displaying student marks. Create a registration form using basic form elements.	12
II	Apply CSS styles to a profile page. Design a responsive layout for a basic webpage. Create a styled navigation menu using and CSS.	12
III	Create a PHP script to process a registration form. Develop a program to calculate factorial, prime check, etc. Form validation using PHP.	12
IV	Create a feedback form that stores data in a .txt file. User login system with sessions. File upload form with validations.	12
V	Create a Student Management System using PHP and MySQL. Design a login page that validates credentials from a database. Display all student records from the database in an HTML table.	12

SUGGESTED READINGS:A handbook on web development by A Jashnani

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

SEMESTER - VIII

I.T. DSE-10:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. DSE-10	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
FOURTH YEAR	**SEMESTER: EIGHT**	**COURSE:I.T.DSE-10**

SUBJECT:INFORMATION TECHNOLOGY

PAPER TITLE: DATA WAREHOUSING AND DATA MINING(THEORY)

CREDITS: 04 | **NO OF LAB LECTURES:**

CourseOutcome: By the end of this course, students should be able to understand the various concepts of data warehousing and data mining.

UNIT	TOPICS	NO OF LAB LECTURES
I	Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse, System, Major issues in Data Mining.Data Preprocessing: Need for Preprocessing the Data, Data cleaning, Date Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.	12
II	Data Warehouse and OLAP Technology for Data Mining, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.	12
III	Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.Classification and Prediction: Issues Classification and Prediction	12
IV	Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods	12
V	Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining and Text Mining.	12

SUGGESTED READINGS: Data mining Concepts and Techniques by Jiawei Han, Micheling Kamber, Jian Pei

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

List of General Electives (GE) Papers for Ist -VIth Semester

LIST OF ALL PAPERS (GE) WITH SEMESTER WISE TITLES IN INFORMATION TECHNOLOGY					
YEAR	**SEMESTER**	**COURSE**	**PAPER TITLE**	**THEORY/ PRACTICAL**	**CREDITS**
UNDERGRADUATE CERTIFICATE IN INFORMATION TECHNOLOGY					
FIRST YEAR	**I**	**I.T. GE-1**	**FUNDAMENTALS OF COMPUTING**	**THEORY**	**4**
	II	**I.T. GE -2**	**FUNDAMENTALS OF COMPUTING LAB**	**PRACTICAL**	**4**
UNDERGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY					
SECOND YEAR	**III**	**I.T. GE -3**	**BASIC PROGRAMMING WITH C++**	**THEORY**	**4**
	IV	**I.T. GE -4**	**WEB TECHNOLOGY**	**THEORY**	**4**
BACHELOR OF INFORMATION TECHNOLOGY					
THIRD YEAR	**V**	**I.T. GE -5**	**CYBER SECURITY AND LAW**	**THEORY**	**4**
	VI	**I.T. GE -6**	**CORE JAVA PROGRAMMING**	**THEORY**	**4**
BACHELOR OF INFORMATION TECHNOLOGY WITH HONOURS					
FOURTH YEAR	**VII**	**I.T. GE -7**	**E- COMMERCE**	**THEORY**	**4**
	VIII	**I.T. GE -8**	**GREEN COMPUTING**	**THEORY**	**4**

SEMESTER - I

I.T. GE-1:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-1	04	-	-	-	Passed Class XII with Maths	Nil

UNDERGRADUATE CERTIFICATE IN INFORMATION TECHNOLOGY		
FIRSTYEAR	SEMESTER:FIRST	COURSE:I.T.GE-1
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE: FUNDAMENTALS OF COMPUTING (THEORY)		
CREDITS: 04	NO OF LAB LECTURES:	

Course Outcome: By the end of this course, students should be able to understand the fundamental concepts and components of information technology. Identify the various types of information systems and their applications.

UNIT	TOPICS	NO OF LAB LECTURES
I	Definition and scope of Information Technology (IT), Evolution of IT and its impact on society, Components of an IT system: hardware, software, data, network, Overview of computer organization and architecture, Introduction to computer software: system software and application software.	15
II	Basics of computer operations: input, processing, output, storage, Overview of computer memory and storage devices, Understanding data representation: binary, decimal, hexadecimal, Introduction to operating systems and their functions, Introduction to computer networks and the internet.	15
III	Software categories: system software and application software, Basics of programming languages: high-level, low-level, and scripting languages, Introduction to algorithms and flowcharts	15
IV	Ethical and legal issues in IT: privacy, copyright, cyber laws, IT in business and management: Enterprise Resource Planning (ERP), IT in education, healthcare, and government sectors, Emerging trends in information technology, Future prospects and challenges in IT.	15

SUGGESTED READINGS:

Computer fundamentals by Pradeep k. Sinha

"Information Technology: Principles and Applications" by A. S. Godbole

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation ofstudents.Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline andParticipationin Different Activities)

Suggested Equivalent Online Courses:SWAYAM,MOOCS,

SEMESTER - II

I.T. GE-2: PRACTICAL

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-2	04	-	-	-	Passed Class XII with Maths	Nil

UNDERGRADUATE CERTIFICATE IN INFORMATION TECHNOLOGY		
FIRST YEAR	SEMESTER:SECOND	COURSE:I.T.GE-2
SUBJECT: INFORMATION TECHNOLOGY		
PAPERTITLE: FUNDAMENTALS OF COMPUTING LAB (PRACTICAL)		
CREDITS: 04	NO OF LAB LECTURES:	

Course Outcome: : By the end of this course, students should be able to understand the fundamental concepts and components of information technology with basic programming and it's applications.

UNIT	TOPICS	NO. OF LABLECTURES
I	**Software:** Software and its need, Types of Software :-System software, Application software. Ms Office. **Operating System:** Operating System, Function of Operating System, OS classification (Batch, Multiprogramming, Multitasking, Multithreading, Multiprocessing, Multiuser, Timesharing, Real Time). DOS. **Translators:** Compiler, Interpreter and Assembler.	15
II	**Programming Concepts**: Elements of Procedure Oriented Programming and Object-Oriented programming, Objects, Classes, and OOPs features.	15
III	**Conditional Control Statements:** If-else , switch-case **Loops:** While, do while, for Implementing programs on conditional & loops break, continue, go to keywords	15
IV	Array and its types: Single dimensional and Double dimensional Declaration, accessing array data, Implementation of array operations. Function and its types, call by value, call by reference and recursion	15

SUGGESTED READINGS:

RajaramanV.,"FundamentalsofComputers",Prentice-HallofIndia.
NortonP.,"IntroductiontoComputers",McGrawHillEducation.
GoelA.,"ComputerFundamentals",Pearson.

Suggested Equivalent Online Courses:SWAYAM,MOOCS

SEMESTER - III

I.T. GE-3 : THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-3	**04**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATE DIPLOMA IN INFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:THIRD**	**COURSE: I.T.GE-3**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: BASIC PROGRAMMING WITH C++(THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: By the end of this course, students should be able to understand the fundamental concepts of object-oriented programming. Design and implement C++ programs using classes, objects, and inheritance. Apply polymorphism and templates to develop reusable code and to utilize advanced features of C++ to develop efficient and modular programs

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UNIT	TOPICS	NO OF LAB LECTURES
I	OOP concepts: Abstraction, Encapsulation, Inheritance, Polymorphism, Procedural Vs. Object Oriented Programming, Principles of OOP and their benefits. Program structure and basic syntax in C++, Namespaces, Identifiers, Variables, Constants, Enums, Operators and typecasting in C++.	**15**
II	Classes and Objects in C++, Access specifiers: Public, Private, Protected, Constructors and Destructors in classes.	**15**
III	Concept of Inheritance and its types, Polymorphism and function overloading, Virtual functions and abstract classes	**14**
IV	Introduction to exception handling, try-catch blocks, Exception propagation, File input and output operations in C++.	**16**

SUGGESTED READINGS:

"Object-Oriented Programming with C++" by Balagurusamy.
"C++: The Complete Reference" by Herbert Schildt.
"Programming in C++" by Ashok N. Kamthane.
"Let Us C++" by Yashavant Kanetkar.

SEMESTER - IV

I.T. GE-4:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-4	**04**	**-**	**-**	**-**	Must have passed certificate course in I.T.	**Nil**

UNDERGRADUATEDIPLOMAININFORMATION TECHNOLOGY		
SECOND YEAR	**SEMESTER:FOURTH**	**COURSE:I.T.GE-4**
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE: WEB TECHNOLOGY(THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

Course Outcome: The students will engage in the practical knowledge of web designing with HTML. Features of HTML. Style Sheets: Need for CSS,

UNIT	TOPICS	NO OF LABLECTURES
I	Introduction to World Wide Web and its work, Web Browsers, Search Engine, Downloading, Hyper Text Transfer Protocol (HTTP), URL, Web Servers, FTP, Web publishing- Domain Name Registration, Space on Host Server for Web Site, Maintain and Updating.	**14**
II	HTML: Elements of HTML & Syntax, Comments, Headings, Paragraph, Span, Pre Tags, Backgrounds, Formatting tags, Images, Hyperlinks, div tag, List Type and its Tags, Table Layout, div, Use of Forms in Web Pages.	**16**
III	Internet Basics: Evolution of Internet, Basic internet terms and applications. ISPAnatomy of an e-mail Message, basic of sending and receiving, E-mail ProtocolMailing List- Subscribing, Unsubscribing.	**14**
IV	CSS**:** Introduction to Cascading Style Sheets, Types of Style Sheets (Inline, Internal and External), using Id and Classes, CSS properties: Background Properties, Box Model Properties, Margin, Padding, List Properties and Border Properties.	**16**

SUGGESTED READINGS:

HTML and CSS: Design and build websites by Jon Duckett

SEMESTER - V

I.T. GE-5:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-5	04	-	-	-	Diploma in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER:FIFTH**	**COURSE:I.T.GE-5**
SUBJECT:INFORMATION TECHNOLOGY		
PAPERTITLE:CYBER SECURITY AND LAW(THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

UNIT	TOPICS	NO OF LAB /LECTURE
I	Cyber Security: definition, cybercrime and information security, cybercriminals, classification of cybercrime, cybercrime Era. Cyber offences: categories of cybercrime, how criminals plan the attack, cyber stalking, cyber cafe and cybercrime, botnets and cybercrime, Cloud Computing and cybercrime.	6
II	Tools and methods used in cybercrime: phishing and Identity theft; methods of phishing, spear phishing, types of phishing scams, phishing toolkits, and spy phishing, Personally Identifiable Information, types and techniques of ID theft, password cracking, key loggers and spywares, backdoors, steganography,	6
III	Cybercrime on mobile and wireless devices: Security challenges posed by mobile devices, attacks on wireless networks, credit card frauds mobile and wireless era. Authentication security service, attacks on mobile phones; mobile phone theft, mobile virus, phishing, vishing, smishing, hacking Bluetooth.	5
IV	Cybercrime and Cyber Security: Cyber Law, The Indian IT Act, Digital Signatures and IT Act, Cyber security and organizational implications, Cyber crisis management, Anti- Cybercrime Strategies, Cybercrime and Cyber terrorism. Cyber crime and Indian IT Act 2000.	5
V	Computer forensics: introduction, computer forensics and digital evidence, digital forensics life cycle, computer forensics and steganography	3

SUGGESTED READINGS:

Fundamental of Cyber security by Bhusan Mayank Rathore Rajkumar

Cryptography and network security by William stallings

Suggested Continuous Evaluation Methods:

Assignment/Practical/VivaVoce/Test/Quiz(MCQ)/Seminar/Presentations/Researchorientationof students.OverallperformancethroughouttheSemester(includesAttendance,Behaviour,DisciplineandParticipationin Different Activities)

SEMESTER - VI

I.T. GE-6:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-6	04	-	-	-	Diploma in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY		
THIRD YEAR	**SEMESTER: SIXTH**	**COURSE:I.T.GE-6**
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: OOPS WITH JAVA(THEORY)		
CREDITS: 04	**NO OF LAB LECTURES:**	

UNIT	TOPICS	NO OF LAB LECTURES
I	**Introduction to Java:** evolution, features, comparison with C and C++;Java program structure; tokens, keywords, constants, variables, data, type casting, statements, Operators and Expression; Conditional Statements and Loop Statements.	12
II	**Class: S**yntax, instance variable, class variables, methods, constructors, overloading of constructors and methods. Arrays, Strings and Vectors.	12
III	**Inheritance:** types of inheritance, use of super, method overriding, finalclass, abstract class, wrapper classes. Interface, Packages and visibility controls.	12
IV	**Errors and Exceptions:** Types of errors, Exception classes, Exceptionhandling in java, use of try, catch, finally, throw and throws. Taking user input, Command line arguments.	12
V	**Multithreaded Programming:** Creating Threads, Life cycle of thread, Thread priority, Thread synchronization, Inter-thread communication, Implementing the Runable Interface.	12

SUGGESTED READINGS:
Programming with Java by E Balagurusamy

Suggested Continuous Evaluation Methods:

Assignment /Practical/ Viva Voce/ Test / Quiz (MCQ) / Seminar/ Presentations/ Research orientation ofstudents.Overall performance throughout the Semester (includes Attendance, Behaviour, Discipline andParticipationin Different Activities)

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in

SEMESTER - VII

I.T. GE-7:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-7	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY WITH HONOURS

FOURTH YEAR	SEMESTER: SEVENTH	COURSE:I.T.GE-7

SUBJECT:INFORMATION TECHNOLOGY

PAPER TITLE: E- COMMERCE

CREDITS: 04 | **NO OF LAB LECTURES:**

UNIT	TOPICS	NO OF LAB LECTURES
I	Introduction, Electronic Commerce Framework, the Anatomy of E- Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.	10
II	Consumer Oriented Applications, mercantile process models, mercantile models from the consumer's perspective, Mercantile from the merchant's perspective.	10
III	Types of Electronic Payment Systems, Digital Token-Based Electronic Payment Systems, Smart Cards & Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk & Electronic Payment Systems, Designing Electronic Payment Systems.	10
IV	Electronic Data Interchange, EDI Applications in Business, EDI implementation, MIME, and value added networks. Intra organizational E-Commerce, Macro forces and Internal Commerce, Work flow automation and Coordination, Customization and Internal Commerce, Supply Chain Management (SCM).	10
V	Making a business case for a Document Library, Digital document types, Corporate Data warehouses, Advertising and Marketing, the new age of Information Based Marketing, Advertising on Internet, charting the Online marketing process, Market Research.	10
VI	Multimedia and Digital video, Key Multimedia concepts, Digital Video & Electronic Commerce, Desktop Video Processing, Desktop Video Conferencing.	10

SUGGESTED READINGS: E- Commerce by P.T. Joseph, S.J.

SEMESTER - VIII

I.T. GE-8:THEORY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title	Credits	Credit Distribution of the Course			Eligibility Criteria	Pre-requisites of the course (if any)
		Lecture	Tutorial	Practical/Practice		
I.T. GE-8	04	-	-	-	Bachelor in I.T.	Nil

BACHELOR OF INFORMATION TECHNOLOGY WITH HONORS		
FOURTH YEAR	SEMESTER: EIGHT	COURSE:I.T.GE-8
SUBJECT:INFORMATION TECHNOLOGY		
PAPER TITLE: GREEN COMPUTING		
CREDITS: 04	NO OF LAB LECTURES:	

UNIT	TOPICS	NO OF LAB LECTURES
I	Overview and Issues: Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power. Initiatives and Standards: Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: Japan, China, Korea.	12
II	**Minimizing Power Usage:** Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software.**Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Heat Datacentre Design, Centralized Control, Design for Your Needs, Put Everything Together	12
III	Changing the Way of Work: Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Going Paperless, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles.	12
IV	Recycling: Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online	12
V	Greening Your Information Systems: Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.	12

SUGGESTED READINGS: Innovative Computing for Green Technologies

Suggested Equivalent Online Courses:SWAYAM,MOOCS,https://vidyamitra.inflibnet.ac.in