KURUKSHETRA UNIVERSITY
KURUKSHETRA

Syllabus

for

Under-Graduate Programme

Bachelor of Science (B.Sc.) (Hons) (Information Technology)

(5^{th} & 6^{th} Semester)

Under Multiple Entry-Exit, Internship and CBCS-LOCF in accordance to NEP-2020 w.e.f. 2025-26

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	FIFTH		
Name of the Course	MICROPROCESSOR 8085 ARCHITECTURE & PROGRAMMING		
Course Code	B23-HIT-501		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	CC-9/MCC-A9		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basic knowledge of Digital Electronics and Circuits		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1** Perform in depth study of microprocessor architecture and programming using the Intel 8085 microprocessor. **CLO-2:** understand various instructions used for low level programming. **CLO-3:** learn about different 8085 instruction sets and addressing modes **CLO-4**: analyze given problem and write programs using 8085 assembly language. **CLO-5**:Present the experimental results and conclusion by having Hands-on experience in the		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Introduction:** Introduction to Microprocessors, microcomputer and single chip microcomputer, Components of Microprocessor: Registers, ALU and control & timing, CPU, I/O devices, clock, memory, bussed architecture, tri-state logic, address bus, data bus and control bus.	**11**
II	**Architecture and Programming of 8085:** Architecture of 8085 Microprocessor, Pin Description of 8085, Instruction set of 8085, Fetching and Executing Instructions, Idea of fetch execute overlap	**11**
III	**Instruction Set:** : Assembly Language Programming Basics, Data Transfer operations, Arithmetic Operations, Logic Operations, Branch Operations, Writing Assembly language Programs	**11**
IV	**Programming Technique**: Looping, Counting, and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to Memory, Logic Operations: Rotate, Logic Operations: Compare **8085 Programming**: Programs of Addition, Subtraction, Multiplication, Division , Ascending/Descending, Largest/Smallest	**12**
V*	**Students have to perform six practicals out the list :** 1. Addition and Subtraction of Two 8-Bit Numbers or microprocessor-Kit. 2. Addition and Subtraction of Two 16-Bit Numbers or microprocessor-Kit. 3. Multibyte Addition/Subtraction of two numbers by repetitive addition/subtraction on Microprocessor-kit. 4. Division of two 8-Bit numbers by repetitive subtraction on microprocessor-Kit. 5. Multiplication of Two 8-Bit Numbers on Microprocessor–Kit. 6. Find the smallest/largest number from a give series of numbers on Microprocessor-Kit. 7. To sort a given series of unsigned numbers in Ascending order on Microprocessor-kit. 8. To sort a given series of unsigned numbers in Descending order on Microprocessor-kit. 9. Check even parity/add parity of binary number on microprocessor-Kit.	**30**

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Digital Computer Electronics- A P Malvino (2nd Edition)
2. Microprocessor Architecture, programming and application with the 8085 by R S Gaonkar
3. Fundamentals of Microprocessors and Microcontrollers by B.RAM
4. Introduction to microprocessor 8085, D K Kaushik, Dhanpat Rai Publications

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	FIFTH		
Name of the Course	OPERATING SYSTEMS		
Course Code	B23-HIT-502		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	CC-10/MCC-A10		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basic knowledge of computer		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: CLO-1: learn about the basics of operating systems and its structure. CLO-2: understand the concept of communications and synchronization CLO-3: learn about the memory management and storage management. CLO-4: understand the concepts of file management and file system implementation CLO-5: Handson practice of programming using UNIX/LINUX		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Operating System:** Introduction to Operating System, Types of Operating Systems, Operating System Architecture, Concept of System Calls, Virtual Machine and Booting. **Process Management:** Process Concept, Process States, Process Control Block, Context Switching, Schedulers, Operation of Processes Scheduling: Basic concepts, Scheduling criteria, Scheduling Algorithms	**12**
II	**Inter-process Communication and Synchronization:** Cooperating Processes, Inter-process Communication: Producer Consumer Problem, Process Synchronization: Critical Section, Hardware supported solutions, Software solutions. **Deadlocks:** Deadlocks, Graphical representation of a Deadlock, handling Deadlocks: Prevention, Avoidance, Detection and Recovery	**11**
III	**Memory Management:** Logical versus physical Address Space, Overlays, Swapping, Contiguous Memory Management: Single memory management, Fixed partition memory management, Variable Partition memory management, Non Contiguous Memory Management: Paging, Segmentation **Virtual Memory:** Introduction to Virtual Memory, Demand Paging, Page Replacement policies, Trashing, Cause of Thrashing**.**	**11**
IV	**File Management:** File Concept, File Attributes, File Operations, File Types, Access methods, Directory Structure. **File System Implementation:** File system structure, allocation methods, Free-space management, directory implementation, efficiency & performance, recovery, Directory systems & operations.	**11**
V*	**Students have to perform six practicals out the list :** 1. Study of Basic commands of Linux/UNIX. 2. Study of Advance commands and filters of Linux/UNIX. 3. Write a shell script to generate mark sheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student. 3. Write a shell script to display multiplication table of given number 4. Write a shell script to find factorial of given number n. 5. Write a shell script which will accept a number b and display first n prime numbers as output. 6. Write a menu driven shell script which will print the following menu and execute the given task. a. Display calendar of current month b. Display today's date and time c. Display usernames those are currently logged in the system. 7. Write a shell script to read n numbers as command arguments and sort them in descending order 8. Write a shell script to generate mark sheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student. 9. Write a shell script to display multiplication table of given number. 10. Write a shell script to find factorial of given number n. 11.Write a shell script which will accept a number b and display first n prime numbers as output. 12. Write a shell script which will generate first n fibonnacci numbers like: 1, 1, 2, 3, 5, 13, …	**30**

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**End Term Examination:** **Theory: 50 Marks** **Practical: 20 Marks**
Part C-Learning Resources	
Recommended Books/e-resources/LMS: 1. Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos 2. Fundamentals of operating system by Anshuman Sharma. 3. Operating System Concepts 8th Edition By Abraham Silberschatz, Peter B. Galvin, Greg Gagne 4. Operating Systems Tata McGraw Hill by Achyut S Godbole 5. Operating System Mc Graw Hill by Madnick & Donomen	

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	FIFTH		
Name of the Course	WEB DEVELOPMENT USING ASP		
Course Code	B23-HIT-503		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	DSE-A2		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basics of computer fundamentals		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** understand the basic concept of ASP.NET **CLO-2:** learn about API documentation and core applications of ASP.NET **CLO-3:** know about ASP.NET Server Controls and caching **CLO-4:** programming concepts of ASP.NET **CLO-5:** implementation of ASP.NET for web development and its various applications		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	Overview of Web Development, Introduction to ASP.NET. ASP.NET MVC Basics: Model-View-Controller (MVC) Architecture, Controllers and Actions, Views and Razor Syntax. Database Design and Entity Framework: Introduction to Databases (SQL Server) Entity Framework Basics, Code-First Approach	**11**
II	**ASP.NET Core Web API:** Building RESTful APIs, Authentication and Authorization, API Documentation (Swagger), Introduction to Front-End Frameworks (React, Angular, or Vue.js), Integration with ASP.NET Core, Deploying ASP.NET Core Applications, Hosting Options (Azure, AWS, etc.) Security Best Practices: Authentication and Authorization in ASP.NET Core, HTTPS and Data Protection	**11**
III	ASP.NET Server Controls, Standard Controls, HTML Controls, Understanding ASP.NET State Engine **Caching :** Introduction to Caching Data ,Different Ways to Cache Data in ASP.NET Web Applications, Security-Identity, Authentication, Authorization, Using Login Controls , Configuring the Web Application	**11**
IV	**Web Service –** What is web service, ASP.NET Web services, Creating a simple web service, Consuming Web service **Introduction to Programming:-** Data Types and Variables, Statements, Methods: Functions and Subroutines. Consistent Page Layout with Master Pages, Using a Centralized Base Page. Structured Exception Handling : try, catch, finally blocks, throwing exceptions, Err object, Using masked Textboxes	**12**
V*	**Students have to perform any three practicals out the list and any one small project based on ASP.NET:** 1. (a) Setting up Development Environment (Visual Studio, ASP.NET Core) (b) Install Visual Studio and ASP.NET framework. (c) Create a new ASP.NET web application project. **2. Creating Basic Web Forms:** (a) Create a simple web form with HTML controls. (b) Use ASP.NET server controls like TextBox, Button, Label, etc. (c) Implement basic event handling (e.g., button click event). **3. Data Binding:** (a) Bind data from various sources (such as databases, XML files) to ASP.NET controls. (b) Use data-bound controls like Grid View, Repeater, etc. (c) Perform CRUD operations (Create, Read, Update, Delete) with data. **4**. Write an ASP.Net application to retrieve form data and display it the client browser in a table format. **5.** Create a web application using ASP.NET which performs basic data Manipulations: (i). Insertion (ii) Updating (iii) Deletion (iv) Selection **6. Design your Web Application: D**esign your application using ASP.NET with a user-friendly interface. You can use HTML, CSS, and JavaScript to create a visually appealing front end.	**30**

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**End Term Examination:** **Theory: 50 Marks** **Practical: 20 Marks**
Part C-Learning Resources	
Recommended Books/e-resources/LMS: 1. "ASP.NET Core in Action" by Andrew Lock 2. "Pro ASP.NET MVC Framework" by Adam Freeman 3. The Complete Reference ASP .NET, MacDonald, Tata McGraw Hill	

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	FIFTH		
Name of the Course	WEB DEVELOPMENT USING PHP		
Course Code	B23-HIT-504		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	DSE-A2		
Level of the course	300-399		
Pre-requisite for the course (if any)	-		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** build Dynamic web site using server side PHP Programming and Database connectivity **CLO-2:** learn the basics of various types of variables and operators in PHP **CLO-3:** understand the use of strings and Arrays **CLO**-4: learn how to connect PHP with MySQL **CLO**-5: Handson practice with PHP		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**PHP:** Installing and Configuring MySQL and PHP, Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, cookies, Session, dynamic contents.	**11**
II	**Variables in PHP:** Using loose typed variables Assigning variables Overview of numeric, string and other types Assigning a variable to itself **Global Variables & Data Types:** Global Variables in PHP Data Types in PHP. Types casting **PHP Operators:** Arithmetic operators Logical operators Comparisons Operator precedence **Numbers in PHP:** Making calculations Using built-in numeric functions Incrementing and decrementing **Database fundamentals/Databases with PHP:** Structuring a database Using tables , Table relationships , Common data types	**11**
III	**Introduction to Strings and its function:** Concatenating strings Trimming strings Removing slashes and other harmful characters String functions **Introduction to Arrays and multidimensional Arrays:** Numerically Indexed Array Associative Arrays Sorting Arrays Recording Arrays **Control structures in PHP:** The If statement FOR loops While loops The Switch **Transferring information between PHP pages:** GET and POST Different form field types Self-referencing forms Form handlers	**11**
IV	**Creating a database:** Using PHPmyAdmin Adding a table, Populating a table with types and data, Browsing a table **Getting PHP to connect to MySQL:** Using the mysql_connect() function , Using the mysql_select_db() function, Testing a connection, Writing a sample error trap **Querying MySQL using PHP/ Retrieving from database:** Writing SQL queries, Using Select, Insert, Update and Delete Querying MySQL and returning results , Interpreting the returned array **Project/ Building a Web Application:** Creating pages to: Add entries, Modify entries, List entries ,Filter entries	**12**
V*	**Students have to perform six practicals out the list :** 1. Install and Configure PHP, web server and MYSQL 2. Write a Program to print" Welcome to PHP" 3. Write a simple PHP program to using expressions and Operators 4. Write a PHP program to demonstrate the use of decision making control structure using: (a) IF statement (b) IF else statement (c) Switch statement 5. Write a PHP program to demonstrate the Looping Structure using (a) While (b) Do-while (c) For statement 6. Write a PHP program for creating and manipulating-a) Indexed array b) Associative array c) Multidimensional array. 7. Write a PHP program to- Calculate length of string. • Count the number of words in string without using string functions. 8. Write a simple PHP program to demonstrate use of various built-in string functions.	

	9. Write a simple PHP program to demonstrate use of simple function and parameterized function. 10. Develop a simple application to - a) Enter data into database √ b) Retrieve and present data from database. 11. Develop a simple application to Update, Delete table data from database.	

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Head First PHP &MySQL , O'Reilly Media, Inc , Michael Morrison, Lynn Beighley
2. Sams Teach Yourself PHP, MySQL, and Apache All in One" by Julie C. Meloni, Publisher: SAMS ,ISBN 0-672-32976-X
3. Web enabled development application by Ivan Byross: Commercial; TMH
4. PHP: The Complete Reference , by Steven Holzner Mcgraw Higher Ed
5. PHP and MySQL Web Development , by Luke Welling , Pearson Education india

Session: 2025-26			
Part A – Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	FIFTH		
Name of the Course	DATA STRUCTURE		
Course Code	B23-HIT-505		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	DSE-A3		
Level of the course	300-399		
Pre-requisite for the course (if any)	-		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1** explore the brief idea and introduction to data structure elements **CLO-2 :** understand various types of Arrays **CLO-3 :** learn the idea of stack and its applications **CLO-4 :** understand the concepts of Tree and its representation **CLO-5:** Make the get the experimental exposure and relate it with theoretical aspects.		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.			

Unit	Topics	Contact Hours
I	**Introduction:** Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures, Algorithms complexity and time-space tradeoff, Big-O notation. **Strings:** Introduction, strings, String operations, Pattern matching algorithms	**11**
II	**Arrays:** Introduction, Linear arrays, Representation of linear array in memory, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse matrix. Linked List: Introduction, Array vs. linked list, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Garbage Collection, Applications of linked lists. Algorithm of insertion/ deletion in SLL.	**11**
III	**Stack**: Primitive operation on stack, algorithms for push and pop. Representation of Stack as Linked List and array, Stacks applications: polish notation, recursion. Introduction to queues, Primitive Operations on the Queues, Circular queue, Priority queue, Representation of Queues as Linked List and array, Applications of queue. Algorithm on insertion and deletion in simple queue and circular queue.	**11**
IV	**Trees & Graphs** - Basic Terminology, representation, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree, Traversal of binary trees:- In order, Preorder & post order, Applications of Binary tree. Algorithm of tree traversal with and without recursion. Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs.	**12**
V*	**Students have to perform six practicals out the list :** 1. (a) Write a program to store the elements in 1-D array and perform the operations like searching, sorting and reversing the elements. (b) Read the two arrays from the user and merge them and display the elements in sorted order. (c) Write a program to perform the Matrix addition, Multiplication and Transpose Operation **2. Implement the following for Linked List:** **(a)** Write a program to create a single linked list and display the node elements in reverse order **(b)** Write a program to search the elements in the linked list and display the same **(c)** Write a program to create double linked list and sort the elements in the linked list. 3. **Implement the following for Stack:** (a) Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations. (b) Write a program to convert an infix expression to postfix and prefix conversion. 4. **Implement the following for Queue:** (a) Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations. (b) Write a program to implement the concept of Circular Queue 5. **Implement the following data structure techniques:** (a) Write a program to create the tree and display the elements.' (b) Write a program to construct the binary tree. (c) Write a program for in order, post order and preorder traversal of tree	**30**

	6. Write a program to implement bubble sort. 7. Write a program to implement selection sort. 8. Write a program to implement insertion sort.	

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Seymour Lipschutz, "Data Structures", Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines, New Delhi.
2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, "Data Structures Using C", Pearson Education., New Delhi.
3. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Mcgraw-Hill International Student Edition, New York.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison- Wesley, (An Imprint Of Pearson Education), Mexico City.

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	FIFTH		
Name of the Course	ANIMATION TECHNIQUES		
Course Code	B23-HIT-506		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	DSE-A3		
Level of the course	300-399		
Pre-requisite for the course (if any)	-		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1:** Understand how to create realistic and impressive animation. **CLO-2** Produce an illusion of characters adhering to the basic laws of physics. **CLO-3** Get knowledge of various Animation Processes. **CLO-4** Understand the process of computer Animation in 3D. **CLO-5** : make the Handson practice with the various animation techniques		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.			

Unit	Topics	Contact Hours
I	**What is Animation**: -Its definition, early examples of Animation. History of Animation: - Stop Motion Photo Animation, Zoetrope, Thaumatrope, Cel and Paper Animation, early Disney's Cel Animation Processes. **Types of Animation**: -Cel Animation, Stop Motion Animation, Computer Animation, 2-D Animation, 3-D Animation. Uses of Animation , Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation	**11**
II	**Skills for an Animation Artist:** -Visual and creative development of an Artist, importance of observation with minute details, efficiency to draw gestures, facial expressions, good listener, hard work and patience, creative and innovative.	**11**
III	**Basic Principles of Animation:** - Illusion of Life, straight action and pose to pose Timing, Exaggeration, Drama and Psychological Effect, Fade in and fade out, Squash and Stretch, Anticipation, staging, follow through and overlapping action, Arcs, Solid Drawing, Appeal, slow in and slow out, Secondry Action.	**11**
IV	**Various Terms:** -Animation Drawings/Cels, Rough Drawings, Clean ups, Color reference drawings, Layout, Model Sheet, Key Drawings and in Betweens, Master Background, Concept Piece, Character drawing, Story Board.	**12**
V*	**Students have to perform any three activities out the list :** Create web banners in Adobe Flash Create a Logo in Adobe Flash Story boarding: Rules of making storyboard, Techniques of Storyboard. Animation: Stop motion Animation, stop motion using (Video), Photograph, and Sketch, Objects, (Cut-out), Paper Animation: Animation using paper shapes, Flip Book: Rules of making flip book, Techniques of flip book. Clay Modeling & Animation: Designing Character, Props using box and oil based clay, Animation using Clay Characters and props • Set designing: An Introduction to Experimental work using different medium like Stone, Grass, Sand, Hardboard, Pen and ink, Water Colors, Poster Color, Dry brush etc. **Practical/Submissions 1. Flip Book 2. Cut out animation** **Study tour to visit 2D animation production house and prepare a Project report on this visit**	**30**

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**End Term Examination:** **Theory: 50 Marks** **Practical: 20 Marks**
Part C-Learning Resources	
Recommended Books/e-resources/LMS: 1. The complete animation course by Chris Patmore -Baron's Educational Series. (New York) 2. Animation Unleashed by Ellen Bessen, Michael Weise Productions, 2008(U.S.A) 3. Draw Animation by Paul Hardman. 4. The Animator's Survival Kit by Richard Williams, Straus & Giroux Pub. (U.S.A) 5. Flash Professional CC Class Room In a Book - Pearson	

Session: 2025-26			
Part A – Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SIXTH		
Name of the Course	8085 Peripheral Devices and 8051 Microcontroller		
Course Code	B23-HIT-601		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	**CC-11/MCC-A11**		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basics of 8085 Architecture and Programming		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 : understand the concept of Interrupts and basics of 8255 PPI** **CLO-2:** learn about the in depth study of 8253 Timer IC and DMA controller **CLO-3.** Demonstrate the concepts of 8051 microcontroller and its programming **CLO-4** : understand the programming of 8051 microcontroller and its programming **CLO-5 :** Handson the practical aspects of 8085 and 8051 microcontrollers		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Interrupt:** Methods of Input/output operations, Data transfer Schemes, software Interrupts, Hardware interrupts, Interrupt control circuits, Interrupt instructions **Programmable Peripheral Interface 8255**: operational modes of 8255, control word format for 8255, programming in Mode 0, programming in Mode 1, BSR mode.	**11**
II	**Programmable Interval Timer 8253**: Block diagram of 8253, control word format for 8253, Interfacing & programming of 8253, Programming of 8253 in various modes. **Direct Memory Access Controller 8257**: Block diagram, Programming of 8257,	**11**
III	**Microcontrollers-** survey, types, processor architecture, microcontroller memory types, microcontroller features, The 8051 Architecture : Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts.8051 instruction set – data Move Instructions, Logical operations, Arithmetic operations, Jump and call Instructions	**11**
IV	**Basic Assembly Language Programming Concepts:** The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. **Moving Data:** Introduction, Addressing Modes, External Data Moves, Code Memory Read Only Data Moves, Push and Pop Op-codes, Data Exchanges. Basic Design Using a Real-Time Operating System: Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment	**12**
V*	**Students have to perform six practicals or perform three practicals with one project based on 8085 microprocessor or 8051 microcontroller out the list :** 1. Study of IC 8255 , 8253 and 8051 2. Interfacing LED with 8085 using 8255 3. To interface 8253 programmable interval timer to 8085 and verify the operation of 8253 in six different modes 4. To interface DAC with 8085 to demonstrate the generation of square, saw tooth and triangular wave 5. Write an assembly language program to generate a square ware of 1KHz frequency using 8255A. The wave should be available at PA0 terminal of Port-A. 6. Microprocessor based stepper Motor control. 7. Microprocessor based Temperature control. 8. 8051 based Arithmetic Instruction Programming 9. 8051 based Data Transfer Programming 10. 8051 based Boolean & Logical Instructions Programming	**30**

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Microprocessor Architecture, programming and application with the 8085 by R S Gaonkar
2. Fundamentals of Microprocessors and Microcontrollers by B.RAM
3. Introduction to microprocessor 8085, D K Kaushik, Dhanpat Rai Publications
4. The **8051 Microcontroller** and Embedded. Systems. Using Assembly and C. Second Edition. Muhammad Ali Mazidi.
5. Microcontrollers: Architecture, Programming, Interfacing and System Design, Rajkamal Pearson Education India, 2009

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SIXTH		
Name of the Course	Introduction to Python Programming		
Course Code	B23-HIT-602		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	**CC-12/MCC-A12**		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basic concepts of programming languages		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** Learn the syntax and semantics of the Python programming language. CLO-2: Illustrate the process of structuring the data using lists, tuples CLO-3. Understand the need for working with various documents like Excel, PDF, Word and Others CLO-4 : Demonstrate the use of built-in functions to navigate the file system CLO-5 : get the Practical exposure and Handson practice with Python Programming		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.			

Unit	Topics	Contact Hours
I	**Python:** introduction , history, uses ,features, Python variables, Python basic Operators, Python blocks, Data Types, Declaring and using Numeric data types: int, float, complex, Using string data type and string operations slicing string, Defining list and list slicing, Use of Tuple data type ,dictionaries	**11**
II	**Program Flow Control:** Conditional blocks using if, else and else if, for loops, for loop using ranges, string, list and dictionaries, while loops, Loop manipulation using pass, continue, break and else, Programming using conditional and loops block.	**11**
III	**Python File Operation:** Reading config files in python Writing, log files in python, Understanding read functions, read (), readline () and readline (), Understanding write functions, write () and writelines(). Manipulating file pointer using seek Programming using file operations, Class, Exception handling, SQLite, Database connectivity,	**11**
IV	**Functions:** def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number **Classes and objects:** Object-oriented features Attributes, values, The init method ,python constructor, basics of inheritance	**12**
V*	**Students have to perform six practicals out the list :** **1**. A. Create a list and perform the following methods a) insert() b) remove() c) append() d) len () e) pop() f)clear() B. Create a dictionary and apply the following methods a) Print the dictionary items b) access items c) useget( ) d)change values e) use len( ) C. Create a tuple and perform the following methods a) Add items b) len() c) check for item in tuple d)Access items **2.** (a) Write a python program to add two numbers. (b) Write a python program to print a number is positive/negative using if-else. (c) Write a python program to find largest number amongst five numbers. **3**. Write a program to create a menu with the following options a) To perform addition b) To perform subtraction c) To perform multiplication d) To perform division Accepts users input and perform the operation accordingly. Use functions with arguments. **4**(a) Write a python program to find factorial of a given number using function (b) Write a Python function that takes two lists and returns True if they are equal otherwise false **5**(a) Write a program to double a given number and add two numbers using lambda ()? (b) Write a program for filter() to filter only even numbers from a given list. **6**. (a) Demonstrate a python code to implement abnormal termination. (b) Demonstrate a python code to print try, except and finally block statements (c) Write a python program to open and write “hello world” into a file? **7**. (a) Write a python program to display a particular month of a year using calendar module.	**30**

	(b) Write a python program to print all the months of given year. **8.** (a) Write a python program to print date, time for today and now. (b) Write a python program to add some days to your present date and print the date added. (c) Write a python program to print date, time using date and time functions **9. (a)** Write a python program to create a package (college),sub- package (All Deptt),modules(IT,CSE) and create admin and cabin function to module. **(b)** Write a python program to create a package (Engg), sub- package (years),modules (sem) and create staff and student function to module? **10. (a)** Write a python program to concatenate the data frames with two different objects **(b)** Write a python code to read a csv file using pandas module and print the first and last five lines of a file.	

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Al Sweigart, "Automate the Boring Stuff with Python",1st Edition, No Starch Press, 2015.
2. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, Green Tea Press, 2015.
3. Let Us Python by Yashwant Kanitkar BPB Publications

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SIXTH		
Name of the Course	Data Communication & Computer Networks		
Course Code	B23-HIT-603		
Course Type: (CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	**DSE-A4**		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basic idea of computer systems and its terminology		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** learn various types of computer networks and standards along with an insight into the principles of networking CLO-2: analyze the notion of data communication and its related functional components and aspects; CLO-3. understand design issues related to Local area Networks and get acquainted with the prevailing wired and wireless LAN technology standards; CLO-4 : learn about encoding and modulation techniques CLO-5 : Hands on practicals related to data communication		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Network Characterization: Goals and Applications:** Categorization according to Size, Purpose, Design issues & Transmission Technologies; Network Architecture and Service Models; Design issues for the Layers; Reference Models: OSI and TCP/IP; Functions of layers and protocols of TCP/IP; Comparison of OSI & TCP/IP ; Data Transmission using TCP/IP.	**11**
II	**Networking Models & Applications:** Centralized, Decentralized, and Distributed; Client-Server and Peer-to-Peer; File sharing & Web- based; Content Distribution Networks. Introduction to Example Networks: The Internet and its Conceptual View ; Applications of Internet; Accessing The Internet; Connection-Oriented Networks: X.25, Frame Relay and ATM.	**11**
III	**Data Communication Concepts & Components:** Digital and Analog Data and Signals, Asynchronous and Synchronous transmission; bit rate & baud, bandwidth & Channel Capacity; Nyquist Bit Rate, Shannon Capacity; Network Performance Parameters; Transmission Impairment. Connecting Devices & Transmission Media: Network Interface Cards, Connectors, Hubs, Transceivers & Media Connectors; Link-Layer Switches, Bridge, Routers, Gateways, Virtual LANs; Guided Transmission Media; Wireless transmission; Satellite communication	**11**
IV	**Data Encoding & Modulation Techniques:** NRZ, NRZ-I, Manchester and Differential Manchester encoding; 4B/5B ; Pulse Code Modulation & Delta Modulation; Digital to Analog encoding. Switching and Bandwidth Utilization: Methods of Switching; Virtual Circuit & Datagram Networks; Multiplexing; Spread Spectrum. Wired Networks and the Local Loop: Telephone Networks; Modems; Broadband and ADSL; ADSL Versus Cable; Hybrid Fiber-Coaxial Network; Fiber-to-the-Home Broadband. **Data Link Layer:** Communication at the Data Link Layer; Nodes and Links; Link Layer Addressing; Examples of Data Link layer protocols	**12**
V*	**Students have to perform six practicals out the list :** 1. To study various types of transmission media. 2. Concept of Network Device, OSI Model, IP Address and Subnetting 3. Introduction to Network Simulator – Packet Tracer and Connect Computer using Different Network Topology with Wired Media 4. Study of Basic Router Configuration 5. To study LAN using Bus Topology 6. To study LAN using Tree Topology 7. To configure Hub/Switch 8. To study configure Modem of Computer 9. To study interconnections of cables for data communication	**30**
Suggested Evaluation Methods		

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. Andrew S. Tanenbaum, Computer Networks, PHI.
2. Behrouz A Forouzan, Data Communications and Networking, Mc-Graw Hill Education.
3. Michael A. Gallo, William M. Hancock, Computer Communications and Networking Technologies – CENGAGE learning.
4. William Stallings, Data and Computer Communications, PHI.

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SIXTH		
Name of the Course	Data ware Housing & Data Mining		
Course Code	B23-HIT-604		
Course Type: (CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	**DSE-A4**		
Level of the course	300-399		
Pre-requisite for the course (if any)	-		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** To understand the principles of Data warehousing and Data Mining. CLO-2: To be familiar with the Data warehouse architecture and its Implementation. CLO-3. To know the Architecture of a Data Mining system. CLO-4 : To understand the various Data preprocessing Methods. CLO-5 : Learn how to perform data mining tasks using a data mining toolkit (such as open source WEKA),		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			
Instructions for Paper- Setter 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.			

Unit	Topics	Contact Hours
I	**Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.**	**10**
II	**Data Mining**: Introduction, Motivation, Importance, Knowledge Discovery Process, Data Mining Functionalities, Interesting Patterns, Classification of Data Mining Systems, Major issues, Data Preprocessing: Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, Data Visualization, Outliers.	**11**
III	**Data Mining Techniques**: Statistical Perspective on Data Mining, Similarity Measures, Clustering- Requirement for Cluster Analysis, Clustering Methods, Decision Tree- Decision Tree Induction, Attribute Selection Measures, Tree Pruning. Association Rule Mining: Frequent Item-set Mining using Apriori Algorithm, Nearest Neighbour Classification: Performance of Nearest Neighbour Classifiers.	**12**
IV	**Association Rule Mining**: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining	**12**
V*	**Students have to perform any three activities(Seminar/ Project/Case study etc)** 1. Exploring anyone Data ware housing Tools such as Cloudera, Teradata, Oracle, TabLeau 2. Exploring any one Data Mining Tool such as WEKA, Orange ,KNIME, R-Programming 3. LIST OF TOPICS FOR STUDENT SEMINARS/ Project: Fundamentals of Data Mining , Data Mining functionalities , Classification of data mining system , Pre-processing Techniques, Spatial data mining , Web mining, Trends and applications of data mining 4. Case Study: Create Student. ariff file to suggest better college using Decision tree 5. Case Study: Create Placement.ariff file to identify the students who are eligible for placements using KNN	**30**

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc**.(10 Marks)** • Mid-Term Exam:	**End Term Examination:** **Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

1. J Hanes, M. Kamber, Data Mining Concepts and Techniques, Elsevier India.
2. . Ronald K. Pearson, Exploratory Data Analysis Using R, CRC Press.
3. . S. Acharya, Data Analytics Using R, McGraw Hill Education (India) Private Limited.
4. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
5. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
6. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
7. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SIXTH		
Name of the Course	Linux & Shell Programming		
Course Code	B23-HIT-605		
Course Type: (CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	**DSE-A5**		
Level of the course	300-399		
Pre-requisite for the course (if any)	Basic idea of computer systems and its terminology		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** understand the basic concepts and commands of Linux; **CLO-2**: Learn the file management and process manipulation in Linux;; **CLO-3**. understand the concept of system Calls **CLO-4** : understand the concept of system Administration **CLO-5** : Hands on practicals related to LINUX		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	

Part B- Contents of the Course

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	**Introduction**: History, Basic features, architecture, distributions. Installing Linux, Logging in / Logging out. File System: Introduction to files, Organization, Assessing File systems, Structure - boot block, super block, inode block, data block. Basic and Advanced Commands: Directory oriented commands, File oriented commands, File access permissions: chmod, umask, chgrp, groups. General purpose commands.	**11**
II	**File management and Compression**: Computer devices, Disk related commands: dd, du, df, dfspace, fdisk, compressing and uncompressing files. Manipulating Processes and Signals: Basics, process states and transitions, zombie and orphan processes, process oriented commands. Handling foreground and background jobs. Process scheduling using cron, crontab, at, batch. Changing priority. Signal generation and Handling	**11**
III	**System calls:** Files related system calls for opening, creating, reading, writing, relocating file descriptors, closing, duplicating file descriptors, linking, unlinking, accessing file status information, checking permissions, changing ownership, groups and permissions of files. Process related system calls: exec, fork, wait, exit.	**11**
IV	**System Administration**: Booting and shutting down process. Creating, mounting and unmounting file systems. Managing User accounts: creating, modifying & deleting user accounts and groups. Networking Tools: Communication oriented commands. Ping, nslookup, telnet, arp, netstat, route, ftp, trivial file transfer protocol, finger, rlogin.	**12**
V*	**Students have to perform six practicals out the list :** 1. Write a shell script to find the greatest of three numbers 2. Write a Linux shell program to perform basic arithmetic operations using case 3. WAP to check whether a number is palindrome or not 4. WAP to find the electricity charge based on some conditions 5. Write a shell script that checks if the contents of two files are same. If so, delete the second file. 6. Write a Linux shell program to perform convert lowercase to uppercase using tr statement 7. Write a Linux shell program to perform find the reverse of a number 8. Write a Linux shell program to perform display multiplication table 9. Write a Linux shell program to perform string manipulation 10. Write a script for unix filters like grep, tr, sed etc	**30**

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.**(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources
Recommended Books/e-resources/LMS: 1. Harwani B.M., Unix and Shell Programming, Oxford University Press. 2. Goerzen John, Linux Programming Bible, IDG Books, New Delhi. 3. Matthew Neil, Stones Richard, Beginning Linux Programming, Wiley India Pvt. Ltd. 4. Christopher Negus, Linux Bible, Wiley India Pvt. Ltd. 5. Das Sumitabha, You UNIX – The Ultimate Guide, Tata McGraw Hill 6. Richard Peterson, Linux – The Complete Reference, Tata McGraw Hill

Session: 2025-26			
Part A - Introduction			
Name of the Programme	**Bachelor of Science (B.Sc.) (Hons) (Information Technology)**		
Subject	Information Technology		
Semester	SIXTH		
Name of the Course	Internet Concepts & Applications		
Course Code	B23-HIT-606		
Course Type:(CC/MCC/MDC/CC-M/ DSEC/VOC/DSE/PC/AEC/VAC)	**DSE-A5**		
Level of the course	300-399		
Pre-requisite for the course (if any)	-		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: **CLO-1 :** learn the basic concepts used in various internet applications **CLO-2:** get the idea of world wide web and different internet concepts **CLO-3:** understand about security methods **CLO-4 :** understand the fundamentals concepts of E-Commerce **CLO-5 :**		
Credits	**Theory**	**Practical**	**Total**
	3	1	4
Contact Hours	3	2	5
Max. Marks: 100(70 Theory +30 Practical) Internal Assessment Marks: 20 Theory +10 Practical End Term Exam Marks: 50 Theory +20 Practical		Time: 3 Hours each for Theory & Practical	
Part B- Contents of the Course			

Instructions for Paper- Setter

1. Nine questions will be set in all. All questions will carry equal marks.
2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 compulsory and four more questions selecting one question from each unit.

Unit	Topics	Contact Hours
I	Need of information, Internet construction concepts, e-mail concepts, e- mail tasks, e- mail attachments, mailing lists, filtering e- mails, controlling e-mail spam. Protocol, File transfer concepts, files transfer protocol [FTP] programmes, TCP/IP, FAQs, remote login [telnet], network news.	**10**
II	World wide web concepts , search engines and web directories[basic idea] , web, resources, applications [in brief] Types of Internet Connection –Dial Up Connection, ISDN, DSL, Cable TV Internet, Connection, Satellite Internet Connection, Wireless Internet Connection.	**11**
III	Computer security [an introduction] cryptography, data encryption standards, Definitions, breaches of security, security of measures. Classification of virus, prevention and cure, cookies[basic idea], Multimedia concepts , multimedia design considerations, performance and size, online chatting and conferencing concepts	**12**
IV	**E- commerce:** Meaning and Types, Evaluation, types of sites, selling via secure servers interacting with customers, EDI, EFT. Intranet, Intranet vs. Groupware, Intranet Hardware, Intranet Software, Intranet Services Web (HTTP) Publishing, HTML, Hypertext, Communication Systems (Email, Fax), Software used in Electronic mail, Electronic Meeting Systems (Audio conferencing, Video Conferencing, Groupware), Extranet.	**12**
V*	**Students have to perform six practicals out the list :** 1. Create, save and view a basic HTML page. 2. Setting-up of a dial-up Internet account and its testing. 3. Design the steps to create email id on Gmail 4. To send and to receive e-mails & files using various e-mails clients. 5. Learn to set-up internet for use as: - (a) Chat Client (b) Instant Messenger. 6. Practice the use of at least two Web-browsers and to search internet using search-Engines. 7. To download & upload Software/files from an FTP Server using GUI and CUI FTP clients. 8. To connect with a remote machine using TELNET, to access information.	**30**

Suggested Evaluation Methods

Internal Assessment:	**End Term Examination:**
➢ **Theory(20 Marks)** • Class Participation **(5 Marks)** • Seminar/presentation/assignment/quiz/class test etc. **(5 Marks)** • Mid-Term Exam: **(10 Marks)** ➢ **Practicum (10 Marks)** • Class Participation: • Seminar/Demonstration/Viva-voce/Lab records etc.**(10 Marks)** • Mid-Term Exam:	**Theory: 50 Marks** **Practical: 20 Marks**

Part C-Learning Resources
Recommended Books/e-resources/LMS: 1. The Complete Reference: Internet , Millennium Edition- Margret Levine Young 2. The Internet Book – Douglas E. Corner [phi] 3. Multimedia On The Web- Stephen Mc Gloughlin [phi] 4. Learning Guide To Internet [PB. BPB] 5. Business On The Net- Mcmillan