Course: DIGITAL LOGIC AND APPLICATION

UNITS:

1.Digital Systems and Binary numbers

2.Boolean algebra and Gate level minimization

3.Combinational logic

4.Sequential circuits

5.Applications

	Title	Unit Outcomes	Teaching Method
1	1. Digital Systems and Binary numbers		
1.1	Remember Co1 Understanding Co2	Introduction to Number systems, Positional Number systems, Conversions (converting between bases)	PPT, video
1.2	Remember Co1 Understanding Co2	Non positional number systems, Unsigned and Signed binary numbers	Lecture method, PPT
1.3	Understanding Co2 Apply Co3	, Binary Codes, Number representation and storage in computer system	Lecture method, PPT
1.4	Remember Co1 Understanding Co2 Apply Co3	. Logic gates and Logic Circuits Basic	Lecture method, Notes, solve
1.5	Remember Co1 Apply Co3	Universal Gates	Lecture method, Notes, PPT, solve
2	Boolean algebra and Gate level minimization		
2.1	Remember Co1 Understanding Co2	Introduction, Postulates of Boolean Algebra, Two Valued Boolean Algebra,	Lecture method, Explanation , PPT
2.2	Remember Co1 Understanding Co2 Apply Co3	Principle of Duality, Basic Theorems of Boolean Algebra,	Lecture method, Explanation
2.3	Understanding Co2 Apply Co3	Boolean Functions and their Representation	Lecture method, Explanation, apply
2.4	CO1,Analysing Co4	, Gate-Level Minimization (Simplification of Boolean Function),	Demonstration ,PPT
2.5	Remember Co1 Understanding Co2	QuineMcCluskey Method.	Evaluation, PPT
3	Combinational logic		
3.1	Understand Co2 Remember Co1	Introduction of Combinational logIC	Explain
3.2	Understand Co2	Design Procedure for Combinational Logic Circuits	Explain, PPT
3.3	Remember Co1 Understand Co2 Analysing Co4	Analysis for Combinational Logic Circuits	Lecture method, Explanation Demonstrate

3.4	Analysing Co4 Apply Co3	Types of Combinational Circuit	Explanation , PPT
4		Sequential circuits	
4.1	Remember Co1 Understand Co2 Demonstration Co4	Introduction of sequential circuits	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Introduction of Latch,	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	Introduction of Flip-Flops,	Lecture method, Explanation Demonstrate
4.4	Understand Co2 Evaluation Co5 Creating Co6	Introduction of Registers,	Lecture method, Explanation Evaluation
4.5	Understand Co2 Creating Co6	Introduction of Counters	Lecture method, Explanation Evaluation, Creating
5	V Applications		
5.1	Remember Co1 Understand Co2 Analyse Co4	Bit Arithmetic and Logic unit	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	Carry lookahead generator	Lecture method, Explanation Analyse
5.3	Understand Co2 Analyse Co4	, Binary Multiplication and Division algorithm	Lecture method, Explanation
5.4	Understand Co2	Booth's multiplication algorithm	Lecture method, Explanation

Course: Computational Logic and Discrete Structures

1. Course will provide students with an overview of discrete mathematics.
2. Use graphs and trees
3. Define sets and Relations
4. Calculate discrete probabilities.
5. Apply basic and advanced principles of counting

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1 Apply C03	Sets and Elements, Venn Diagrams, Set Operations	Lecture method, diagrams
1.2	Remember Co1 Apply C03	Functions, One-to-One, Onto, and Invertible Functions, Mathematical Functions	Lecture method, PPT
1.3	Remember Co1 Apply C03	Basic Counting Principles, Mathematical Functions	Lecture method, PPT
1.4	Remember Co1 Apply Co3	Data Structures,,Graphs and Multigraphs, Subgraphs, Isomorphic and Homeomorphic Graphs	Lecture method, PPT, diagrams and charts
1.5	Remember Co1 Understanding Co2 Apply C03	Binary Trees,, Complete and Extended Binary Trees, Representing Binary Trees in Memory	Lecture method, Explanation, diagrams and charts
2	Functions and Algorithms		
2.1	Remember Co2 Understanding Co2 Apply Co3	Algebra of Sets, Duality, Finite Sets	Lecture method, diagrams
2.2	Remember Co1 Understanding Co2 Apply Co3	Exponential and Logarithmic Functions, Sequences, Indexed Classes of Sets	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	Permutations, Combinations, the Pigeonhole Principle, The Inclusion–Exclusion Principle	Lecture method, PPT
2.4	Remember Co1 Understanding Co2 Apply C03	Connectivity, Traversable and Eulerian Graphs, Bridges of Königsberg, Labeled and Weighted Graphs	Lecture method, PPT, diagrams and charts
2.5	Remember Co1 Understanding Co2 Apply C03	Traversing Binary Trees, Binary Search Trees, Priority Queues, Heaps, Path Lengths, Huffman's Algorithm, General (Ordered Rooted) Trees Revisited	Lecture method, Explanation, diagrams and charts
3	Techniques of Counting		
3.1	Remember Co1 Apply C03	Counting Principle, Classes of Sets, Power Sets, Partitions, Mathematical Induction	Lecture method, diagrams
3.2	Remember Co1 Understanding Co2 Apply C03	Recursively Defined Functions, Cardinality, Algorithms and Functions, Complexity of Algorithms	Lecture method, diagrams

3.3	Remember Co1 Understand Co2	Combinations with Repetitions, Ordered and Unordered Partitions, Pigeonhole Principle Revisited	Lecture method, PPT
3.4	Remember Co1 Understand Co2	Ordered Sets, Hasse Diagrams of Partially Ordered Sets	Lecture method, PPT, diagrams and charts
3.5	Remember Co1 Apply C03	Queues, Heaps, Path Lengths, Huffman's Algorithm	Lecture method, Explanation, diagrams and charts
4	Graph Theory		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Sample Space and Events, Finite Probability Spaces, Conditional Probability	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Evaluation Co5	Recurrence Relations, Linear Recurrence Relations with Constant Coefficients	Lecture method, Explanation Evaluation
4.4	Remember Co1 Understand Co2 Analyse Co4	Tree Graphs, Planar Graphs, Graph Colorings, Representing Graphs in Computer Memory, Graph Algorithms, Traveling-Salesman Problem, Solved Problems	Lecture method, PPT, diagrams and charts
4.5	Remember Co1 Understanding Co2 Apply C03	Traversing Binary Trees, Binary Search Trees	Lecture method, Explanation, diagrams and charts
5	Binary Trees		
5.1	Remember Co1 Understand Co2 Demonstration Co4	Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations	Lecture method, Explanation Demonstrate
5.2	Remember Co1 Understand Co2 Demonstration Co4	Independent Events, Independent Repeated Trials, Binomial Distribution, Random Variables	Lecture method, Explanation Demonstrate
5.3	Remember Co1 Understand Co2 Evaluation Co5	SecondOrder Homogeneous Linear Recurrence, Relations, Solving General Homogeneous Linear Recurrence Relations	Lecture method, Explanation Evaluation
5.4	Remember Co1 Understand Co2 Analyse Co4	Graph Algorithms: Depth-First and Breadth-First Searches, Directed Cycle-Free Graphs, Topological Sort, Pruning Algorithm for Shortest Path	Lecture method, PPT, diagrams and charts
5.5	Remember Co1 Understanding Co2 Apply C03	Ordered Sets, Hasse Diagrams of Partially Ordered Sets, Consistent Enumeration	Lecture method, Explanation, diagrams and charts

Course: Bsc.IT DBMS

Units :

1. Database system
2. Conceptual modelling and database design
3. Database Design theory and normalization
4. Introduction to SQL
5. Transaction management and concurrency control and recovery

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1	Describe DATABASE SYSTEM RELATIONAL ALGEBRA, Conceptual modelling and database design Database Design theory and normalization	Lecture method, rote method
1.2	UNDERSTANDING CO2	DEMONSTRATE RELATIONAL ALGEBRACLASSIFY: Data modelling using the Entity Relationship model (ER).The enhanced entity relationship model. EXPLAIN Relational database design and further dependencies.	Lecture method, Presentation, Group Discussion.
	APPLYING CO3	Write relational algebra queries for a given set of relations, EXPERIMENT ON SQL, DESIGN RELATIONAL DATA BASE, USE CONCURRENCY AND RECOVERY TECHNIQUE PL SQL	ESEARCH NN METHODOLOGY, PRATICALS.
1.3	ANALYSING CO4	D.B EXCEL AND DATA BASE, DIFFERENTIATE :functional dependencies and NormalizationDEBATE ON NORMALIZATION, QUESTION ON SQL INSPECT TRANSACTION MANAGEMENT	Revision From Different point of You Creating Stimulation
	EVALUATING CO 5	Conclude dbms, revise, revise RD, compare with real EG , summarize transaction management.	Real Life Example
1.4	CREATING CO6	SQL QUARIES, UML DIAGRAM, PLAN, DEVELOP OWN DATABSE, USE SQL	Stimulation, develop

Course: Programming Principles with C

Units :

1.Introduction

2. Type of operators

3. Functions and Program Structure

4. Pointer and Arrays

5. Structures

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Uo1(Remember)	Algorithms, History of C, Structure of C Program. Program Characteristics, Compiler,	Lecture method, diagrams
2.1	Uo1(Remember)	Types of Operators and expression	Lecture method, Charts
3.1	Uo1(Remember)	Basics of functions	Lecture method, Charts
4.1	Uo1(Remember)	Pointer and Addresses, Pointer and Function Arguments,	Lecture method, Charts
5.1	Uo1(Remember)	Basics of structures, Structures and Functions, Arrays of Structures	Lecture method, Charts
5.1	Uo1(Remember)	Basics of structures, Structures and Functions, Arrays of Structures	Lecture method, Charts
2	Type of operators		
1.2	UO2 (Understanding)	Linker and preprocessor, pseudo code statements and flowchart symbols, Desirable program characteristics	Lecture method,
2.2	UO2 (Understanding)	Precedence and order of Evaluation, Control Flow, Block Structure	Lecture method,
3.2	UO2 (Understanding)	User defined and Library functions, Function parameters, Return values	Lecture method,
4.2	UO2 (Understanding)	Arithmetic, Character Pointers and Functions	Lecture method,
5.2	UO2 (Understanding)	Pointers to Structures, Unions, Bit-fields, File management in C:	Lecture method,

3		Functions and Program Structure:		
1.3	UO3 (Apply)	Program structure. Compilation and Execution of a Program, C Character Set, identifiers and keywords, data types and sizes ,	Lecture method, charts
2.3	UO3 (Apply)	Statements and Blocks, If-Else, Else-If, Switch, Loops- While and	Lecture method, Group Activity
3.3	UO3 (Apply)	Recursion External variables, Scope Rules, Standard Input and Output	Lecture method, Group Activity
4.3	UO3 (Apply)	Pointer Arrays: Pointers and Functions,	Lecture method, Group Activity
5.3	UO3 (Apply)	Defining and Opening file, Closing a file	Lecture method, Group Activity
2.6	UO6 (Create)	Write a program using while loop to reverse the digits of a number, factorial ,find the roots of quadratic equation, Fibonacci series	Group Activity, Lab Session
4		Pointer and Arrays		
1.4	UO4 (Analyse)	constants and its types, variables, Character and character strings, typedef, typecasting	Lecture method
2.4	UO4 (Analyse)	For Loops Do-while, Break and Continue, Goto and Labels	Lecture method, Demo
3.4	UO4 (Analyse)	Formatted Output-printf() and Formatted Input- scanf(),	Lecture method, Demo
4.4	UO4 (Analyse)	Command-line Arguments, Pointers to Functions,	Lecture method, Demo
5.4	UO4 (Analyse)	, Input / Output operations on file,	
3.6	UO6 (Create)	WAP to check entered character vowel or consonant, to print day name of week , largest of them without using if statement, Write a program to using strlen(), strcmp() function.	Group Activity, Lab Session
5		Structures		

1.5	UO5 (Evaluate)	a. Write an algorithm and draw flowchart for Area of circle, print the given no. is even or odd, sum of numbers, addition of digits	Group Activity
2.5	UO5 (Evaluate)	Initialization, C Preprocessor	Lecture method, Demo
3.5	UO5 (Evaluate)	Line Input and Output, Error Handling- StdErr and Exit, Header Files	Lecture method, Demo
4.5	UO5 (Evaluate)	Dynamic memory allocation	Lecture method, Demo
5.5	UO5 (Evaluate)	Error handling in C, Random access to files, Command line arguments	Lecture method, Demo
1.6	UO6 (Create)		
4.6	UO6 (Create)	Write a program to print the pattern of asterisks , WAP to print area of square, recursive function, square root, abs() value using function. array in ascending or descending order.	Group Activity, Lab Session
5.6	UO6 (Create)	WAP data types, addition and subtraction and its address using pointer. b. Write a program to perform using pointer.	Group Activity, Lab Session

Course Outcomes

Year   F.Y. B. Sc, F.Y.I.T

Prepared By - Balasaheb Khairnar

Academic Year – 2022-23

Course: Technical Communication Skills

Units :

1. **Fundamentals of Technical Communication**
2. **The Seven C's of Effective Communication**
3. **Active Listening**
4. **Business Writing**
5. **Communication Across Functional Areas**

	Title	Unit Outcomes	Teaching Method
1	**Introduction Technical Communication**		
1.1	Remember Co1	Meaning, objectives, methods and importance of Technical communication	Lecture method, Questionnaire, Group Discussion,
1.2	Remember Co1	Process levels and flow of technical communication	Lecture method, Questionnaire, Group Discussion
	Apply Co3	Visual Aids in Technical Communication	Table Graphs Charts, drawing, Diagrams, Photographs, Maps.
1.3	Remember Co1	Barriers to Communication	Lecture method,
	Remember Co1	Intrapersonal interpersonal barriers	Lecture method, rote method
1.4	Remember Co1 Apply Co3	Verbal, Non-Verbal Communication	Lecture method, Group Discussion
1.5	Remember Co1 Understanding Co2	Cross Cultural Variations	Group Discussion
2	**Seven C's Of Effective Communication**		
2.1	Remember Co1 Understanding Co2	Completeness, Conciseness ,Consideration , Concreteness ,Clarity ,Courtesy ,Correctness are used for effective Communication	Lecture method, Explanation

2.2	Remember Co1 Understanding Co2 Apply Co3	Management Essentials and Importance of Business communication	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	Leading Effective Evaluating planning Of Teleconferencing Meeting and Conferences.	Lecture method, rote method; Explanation Solve
2.4	Analysing Co4	Importance of Group Discussion and team presentation and its benefits ,	Lecture method, Explanation Demonstration
2.5	Evaluation Co5	Functional non-functional roles in GD Assessment team presentation	Evaluation Lecture method, Explanation
3	**Speaking Listening**		
3.1	Apply Co3	Verbal Non-Verbal communications ,How to convey massages within short and Speech .	Demonstrate Lecture method, Explanation
3.2	Apply Co3	Hoe to use formal , semi formal; informal language	Lecture method, Explanation
3.3	Remember Co1 Understand Co2 Demonstration Co4	Types of Listening Traits Active Passive Listener,	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Email Communication and its advantages disadvantages	Lecture method, Explanation
4	**Business Writing**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Types of written communication, Formal, Semiformal Informal	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Business Communication online offline, print media electronic media	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Business Letters, Components Strategies Body format of Business Letters	Lecture method, Explanation Demonstrate
5	**Communication Across Functional Areas**		
	Remember Co1 Understand Co2 Demonstration Co4	Financial Communication, MIS role of Ethical Values Ethical Communication	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Evaluation Co5	Role of ethics in Staff Members Manager Clients in Corporate World	Lecture method, Explanation Evaluation
	Remember Co1 Understand Co2	Audio Visual Aids Graphs visual; textures	Lecture method, Explanation

	Evaluation Co5		Evaluation
	Remember Co1 Understand Co2 Evaluation Co5	Computer generated graphs charts tables visuals animations roles in business communications .	Lecture method, Explanation Evaluation

Reference Books			
Technical Communication: Principles and Practices By Meenakshi Raman And Sangeeta Sharma			
Business Communication By Meenakshi Raman Prakash Sinha			
Effective Business Communication BY Herta Murphy Herbert Hildbrandt Jane Thomas			

Course Outcomes

Year   F.Y.B.Sc .I.T

Prepared By - Balasaheb Khairnar

Academic Year – 2022-23

Course: Green IT

Units :

1. **Green IT Overview**
2. **Green Data Centers**
3. **Sustainable Information And Green Metrics**
4. **Recycling**
5. **Greening Your Information Systems**

	Title	Unit Outcomes	Teaching Method
1	**Green IT Overview**		
1.1	Remember Co1	To understand the concept of Green Technology. To learn Green IT regulating Green IT and different standards. To understand the concept of minimizing power utilization in technology.	Lecture method, Questionnaire, Group Discussion,
1.2	Remember Co1	To know about Green PCs, Green notebooks and servers and Green data centers. To know how the way of work is changing and understand implementation of Paperless work	Lecture method, Questionnaire, Group Discussion
	Remember Co1 Apply Co3	Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power.	Table Graphs Charts, drawing, Diagrams, Photographs, Maps.
1.3	Remember Co1	Regulating Green IT: Laws, Standards and Protocols Introduction, The Regulatory Environment and IT Manufacturers RoHS, REACh, WEEE, Legislating for GHG Emissions and Energy Use of IT Equipment.Nonregulatory Governmen	Lecture method, Diagrams, Table Graphs Charts,

	Remember Co1	Initiatives, Industry Associations and Standards Bodies, Green Building Standards, Green Data Centres , Social Movements and Greenpeace.	Lecture method,
2	**Green Data Centers**		
2.1	Remember Co1 Understanding Co2	Minimizing Power Usage: Power Problems, Monitoring Power Usage, Servers, Low-CostOptions, Reducing Power Use, Data De-Duplication,	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	Virtualization, Management, Bigger Drives, Involving the Utility Company, LowPower Computers, PCs, Linux, Components, Servers	Lecture method, Explanation Audio Visual Method
2.3	Remember Co1 Understanding Co2 Apply Co3	ComputerSettings, Storage, Monitors, Power Supplies, Wireless Devices, Software	Lecture method, Explanation Solve
2.4	Analysing Co4 Remember Co1 Understand Co2	Cooling: Cooling Costs, Power Cost, Causes of Cost, Calculating CoolingNeeds, Reducing Cooling Costs,	Lecture method, Explanation Demonstration
2.5	Evaluation Co5 Remember Co1 Understand Co2	Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised, Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources	Evaluation Lecture method, Explanation
2.6	Evaluation Co5 Remember Co1 Understand Co2	Fans, Humidity, Adding Cooling, Fluid Considerations, System Design, Datacentre Design, Centralized Control, Design for Your Needs, Put Everything Together.	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
3	**Sustainable Information And Green Metrics**		
3.1	Apply Co3 Remember Co1 Understand Co2	Greening IT: Green PCs, Notebooks and Servers, Green Data Centres , Green Cloud Computing, Green Data Storage , Green Software, Green Networking and Communications.	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
3.2	Apply Co3 Remember Co1	Changing the Way of Work: Old Behaviours, starting at the Top, Process Reengineering with Green in Mind, Analysing the Global Impact of Local	Lecture method, Explanation Audio Video Aids

	Understand Co2	Actions, Steps: Water, Recycling, Energy, Pollutants, Teleworkers and Outsourcing, Telecommuting, Outsourcing, how to Outsource.	
3.3	Remember Co1 Understand Co2 Demonstratio n Co4	Going Paperless: Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles.	Lecture method, Explanation
4	**Recycling**		
4.1	Remember Co1 Understand Co2	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,	Lecture method, Explanation
4.2	Remember Co1 Understand Co2	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,	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
4.3	Remember Co1 Understand Co2	Change the mindset, David vs. America Online. Hardware Considerations: Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers,	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
4.4	Remember Co1 Understand Co2	Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection.	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
5	6. **Gree ning Your Infor matio**		

	n Systems		
5.1	Remember Co1 Understand Co2	Greening Your Information Systems: Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction,	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
5.2	Remember Co1 Understand Co2	Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
5.3	Remember Co1 Understand Co2	Staying Green: Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups,	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
5.4	Remember Co1 Understand Co2	Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyse Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations.	Demonstrate Lecture method, Explanation Computer Lab Audio Video Aids
	Books and References:	**Title**	**Author**
	1	**Green IT**	**Toby Velte, Anthony Velte, Robert Elsenpeter**
	2	**Harnessing Green IT: Principles and Practices**	**San Murugesan, G. R. Ganadharan,**
	3	**Green Computing and Green IT Best Practice**	**Jason Harris**

Course: Microprocessor Architecture

Units :

1 Microprocessor, Microcomputers, and Assembly Language
2 Interfacing of I/O Devices
3 Programming Techniques With Additional Instructions
4 Code Conversion, BCD Arithmetic, and 16-Bit Data Operations
5 The Pentium and Pentium Pro microprocessors

	Title	Unit Outcomes	Teaching Method
1	Microprocessor, microcomputers, and Assembly Language		
1.1	Remember Co1	Microprocessor ,Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications.	Lecture method, PPT, Diagram, Explanation
1.2	Remember Co1	Microprocessor Architecture and its operation's, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application.	Real world example, Diagram, Explanation
1.3	Remember Co1	Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing ,Interfacing the8085 Memory Segment.	Real world example, Diagram, Explanation
2	Interfacing of Input/ Output Devices		
2.1	Remember Co1 Understanding Co2	Basic Interfacing concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits.	Lecture method, Real world example Diagram ,Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	The 8085 Programming Model, Instruction Classification, Instruction, Data and Storage, Writing assembling and Execution of a simple program, Overview of 8085 Instruction Set, Writing and Assembling Program.	Explain, PPT, Diagrams.
2.3	Remember Co1 Understanding Co2 Apply Co3	Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program.	Example. Diagram, Explanation
3	Programming Techniques With Additional Instructions		
3.1	Apply Co3	Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging.	Lecture method, Explanation

3.2	Apply Co3	Counters and Time Delays, Illustrative Program: Hexadecimal Counter, Illustrative Program: zero-to-nine (Modulo Ten) Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.	Real world example. Lecture method, Explanation
3.3	Remember Co1 Understand Co2 Demonstration Co4	Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts.	Lecture method, Diagram, PPT, Explanation
4	Code Conversion, BCD Arithmetic, and 16-Bit Data Operations		
4.1	Remember Co1 Understand Co2 Demonstration Co4	BCD-to-Binary Conversion, Binary-to-BCD Conversion, BCD-toSeven-Segment-LED Code Conversion, Binary-to-ASCII and ASCIIto-Binary Code Conversion, BCD Addition, BCD Subtraction, Introduction To Advanced Instructions and Applications, Multiplication, Subtraction With Carry.	Lecture method, Example ,Explanation
4.2	Remember Co1 Understand Co2 Demonstration Co4	Software Development System and Assemblers: Microprocessors-Based Software Development system, Operating System and Programming Tools, Assemblers and Cross-Assemblers, Writing Program Using Cross Assemblers.	Lecture method, Explanation
4.3	Remember Co1 Understand Co2	Interrupts: The 8085 Interrupt, 8085 Vectored Interrupts, Restart as S/W Instructions, Additional I/O Concepts and processes.	Lecture method, Diagram ,Explanation
5	The Pentium and Pentium Pro microprocessors		
5.1	Remember Co1 Understand Co2 Evaluation Co5	Introduction, Special Pentium registers, Memory management, Pentium instructions, Pentium Pro microprocessor, Special Pentium Pro features.	Lecture method, Explanation
5.2	Remember Co1 Understand Co2 Evaluation Co5	Core 2 and later Microprocessors: Introduction, Pentium II software changes, Pentium IV and Core 2, i3, i5 and i7.	Lecture method, Explanation
5.3	Remember Co1 Understand Co2 Evaluation Co5	SUN SPARC Microprocessor: Architecture, Register file, data types and instruction format	Lecture method, Explanation

Year : F.Y.Bsc. IT   Semester: II   Course name: Microprocessor Architecture

	Course Outcome	Teaching Method Used
Co1	- Microprocessor ,Microprocessor Instruction Set and Computer Languages - From Large Computers to Single-Chip Microcontrollers - Applications. - Microprocessor Architecture and its operation's - Memory - I/O Devices - Microcomputer System - Logic Devices and Interfacing - Microprocessor-Based System Application. 8085 Microprocessor unit 8085-Based Microcomputer - Memory Interfacing - Interfacing the8085 Memory Segment.	- Lecture method - PPT - Diagram - Explanation. - Real world example
Co2	- Basic Interfacing concepts - Interfacing Output Displays, Interfacing Input Devices - Memory Mapped I/O - Testing and Troubleshooting I/O Interfacing Circuits. - The 8085 Programming Model - Instruction Classification, Instruction, Data and Storage - Writing assembling and Execution of a simple program - Overview of 8085 Instruction Set, Writing and Assembling Program - Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation - Writing Assembly Languages Programs, Debugging a Program.	- Lecture method - Real world example - Diagram - Explanation - PPT
Co3	- Looping, Counting and Indexing - Additional Data Transfer and 16-Bit Arithmetic Instructions - Arithmetic Instruction Related to Memory - Logic Operations :Rotate, Compare - Dynamic Debugging. - Counters and Time Delays - Illustrative Program Hexadecimal Counter - Illustrative Program: zero-to-nine (Modulo Ten) Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs. - Stack, Subroutine - Restart - Conditional Call - Return Instructions	- Lecture method - Real world example - Diagram - Explanation - PPT

	• Advanced Subroutine concepts.	
Co4	• BCD-to-Binary and Binary-to-BCD Conversion • BCD-to Seven-Segment-LED Code Conversion • Binary-to-ASCII and ASCII to-Binary Code Conversion • BCD Addition, BCD Subtraction • Advanced Instructions and Applications, • Multiplication, Subtraction With Carry. • Software Development System and Assemblers • Microprocessors-Based Software Development system • Operating System and Programming Tools • Assemblers and Cross-Assemblers • Writing Program Using Cross Assemblers • The 8085 Interrupt • 8085 Vectored Interrupts • Restart as S/W Instructions • Additional I/O Concepts and processes.	• Lecture method • Example • Explanation, • diagram
Co5	• Special Pentium registers • Memory management • Pentium instructions • Pentium Pro microprocessor • Special Pentium Pro features. • Core 2 and later Microprocessors • Pentium II software changes • Pentium IV and Core 2, i3, i5 and i7. • SUN SPARC Microprocessor Architecture • Register file • Data types and instruction format	• Lecture method • Explanation

Course Outcomes:

1. CO 1= To become familiar with Microprocessor unit ,it's operations ,Interfacing with I/O and memory & 8085 based Microcomputer.

2. Co2 = Develop an idea about interfacing peripheral devices with microprocessor, Memory mapped I/O , 8085 Programming Model, Writing, assembling and execution of simple assembly language program, data transfer operation ,arithmetic, logic and branch operations.

3. Co3 = Study Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions , Counters and Time Delays, Illustrative Program , Stack, Subroutine, Restart, Conditional Call, Return Instructions.

4. Co4 = Perform BCD-to-Binary Conversion, Binary-to-BCD Conversion, BCD-to Seven-Segment-LED Code Conversion, Binary-to-ASCII and ASCII to-Binary Code Conversion. Learn Software Development System and Assemblers, learn 8085 Interrupt structure.

5. Co5 = Learn about Special Pentium registers, Memory management, Pentium instructions, Pentium II software changes, Pentium IV and Core 2, i3, i5 and i7. SUN SPARC Microprocessor: Architecture, Register file, data types and instruction format.

Mapping of Programme Outcomes and Course outcome

	Com.Sk	Basic knowdge	Solve the prob, Face Challenge	Apply techn	Team leader	ethics, social	Entrepreneurial skill	Total Points	Average Point
Co1	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 2	Yes 3	18	2.6
Co2	Yes 3	Yes 3	Yes 3	Yes 3	Yes 3	Yes 2	Yes 2	19	2.7
Co3	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 2	Yes 2	17	2.4
Co4	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 2	Yes 3	18	2.6
Co5	Yes 3	Yes 3	Yes 1	Yes 3	Yes 2	Yes 2	Yes 2	16	2.3
	15	15	10	15	11	10	12		
	3	3	2	3	2.2	2	2.4		= 12.6

12.6/5 = 2.52

17/7 = 2.4

Attainment and measuring outcomes

Attainment = Total of marks of all students in the course/total number of students

For ex: 620/10 = 62

Passing percentage

Attainment

Attainment Percentage

0-39 unacceptable

40-50 poor

51-60 acceptable

61-70 good

71-80 very good

81-and above   excellent

Graduate Attributes

1. Able to express and understand the opinions with efficient communication skills
2. Attain basic knowledge of various subjects and in depth knowledge in specialized subjects

3. Able to solve and provide solutions for various problems and Refined with competitiveness to face challenges
4. Able to understand and apply technology for improving efficiency in work
5. Able to lead the team and also work as a cooperative member of the team
6. Respecting and adopting morals, ethics and human values & Sensitized towards social and environmental aspects
7. Encouraged for Entrepreneurial and professional skills and awareness about opportunities for entrepreneurship.

Course: Numerical Methods

1. Course will provide students with an overview of numerical methods.
2. Course will enhance the problem solving skills of students using extremely powerful numerical methods.
3. Solutions of Algebraic and Transcendental Equations
4. Approximations and Round-Off Errors

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1 Apply C03	Simple Mathematical Model, Conservation Laws and Engineering Problems	Lecture method,
1.2	Remember Co1 Apply C03	The Bisection Method, The Newton-Raphson Method	Lecture method, PPT
1.3	Remember Co1 Apply C03	Gauss-Jordan Method, Gauss-Seidel Method	Lecture method, PPT
1.4	Remember Co1 Apply Co3	Numerical solution of 1st and 2nd order differential equations	Lecture method, PPT,
1.5	Remember Co1 Understanding Co2 Apply C03	Linear Programming, Linear optimization problem	Lecture method, Explanation,
2	Functions and Algorithms		
2.1	Remember Co2 Understanding Co2 Apply Co3	Significant Figures, Accuracy and Precision	Lecture method,
2.2	Remember Co1 Understanding Co2 Apply Co3	The Regula-falsi method, The Secant Method	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	Numberical differentiation, Numerical integration	Lecture method, PPT
2.4	Remember Co1 Understanding Co2 Apply C03	Taylor series, Euler's Method	Lecture method, PPT,
2.5	Remember Co1 Understanding Co2 Apply C03	Formulation and Graphical solution, Basic solution and Feasible solution	Lecture method, Explanation, diagrams
3	Techniques of Counting		
3.1	Remember Co1 Apply C03	Error Definitions, Round-Off Errors	Lecture method, diagrams
3.2	Remember Co1 Understanding Co2 Apply C03	Forward Difference, Backward Difference	Lecture method, diagrams
3.3	Remember Co1 Understand Co2	Trapezoidal Rule	Lecture method, PPT

3.4	Remember Co1 Understand Co2	Modified Euler's Method, Runge-Kutta Method for 1st and 2nd Order Differential Equations	Lecture method, PPT
3.5	Remember Co1 Apply C03	Classification of Partial Differential Equations of the second order, Difference equation corresponding to Laplace Equation	Lecture method, Explanation
4	Graph Theory		
4.1	Remember Co1 Understand Co2 Demonstration Co4	The Taylor Series, Error Propagation	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Evaluation Co5	Simpson's 1/3rd	Lecture method, Explanation Evaluation
4.4	Remember Co1 Understand Co2 Analyse Co4	Linear Regression, Polynomial Regression	Lecture method, PPT, diagrams and charts
4.5	Remember Co1 Understanding Co2 Apply C03	Liebmann's Iteration Process, Bender-Schmidt's Difference Equation corresponding to the parabolic equation	Lecture method, Explanation,
5	Binary Trees		
5.1	Remember Co1 Understand Co2 Demonstration Co4	Total Numerical Errors, Formulation Errors and Data Uncertainty	Lecture method, Explanation Demonstrate
5.2	Remember Co1 Understand Co2 Demonstration Co4	Lagrange's Interpolation	Lecture method, Explanation Demonstrate
5.3	Remember Co1 Understand Co2 Evaluation Co5	Simpson's 3/8th rules	Lecture method, Explanation Evaluation
5.4	Remember Co1 Understand Co2 Analyse Co4	Multiple Linear Regression, General Linear Least Squares, Nonlinear Regression	Lecture method, PPT,
5.5	Remember Co1 Understanding Co2 Apply C03	Crank Nicolson's difference equations corresponding to the parabolic equation, Difference equation corresponding to the Hyperbolic equation	Lecture method, Explanation,

Course: Object Oriented Programming with C++

Units :

1. INTRODUCTION OF OBJECT-ORIENTED DESIGN
2. FUNCTION IN C++
3. WORKING WITH INHERITANCE IN C++
4. FILE HANDLING IN C++
5. INTRODUCTION TO THE STANDARD TEMPLATE LIBRARY

	Title	Unit Outcomes	Teaching Method
1	INTRODUCTION OF OBJECT-ORIENTED DESIGN		
1.1	Remember Co1	Introduction, Objects, Class and Instance, Polymorphism, Inheritance, Conceptual Modeling Requirements Model , The Role of OOAD in the Software Life Cycle, OOAD Methodologies, Grady Booch Approach,	Lecture method, diagrams
2.1	Understanding Co2	Function Declaration,The Main Function in C++,Recursion ,Call by Reference ,Call by Reference Vs Call by Address , Return by Reference ,Inline Function ,Function Overloading ,Function with Default Arguments	Lecture method, diagrams
3.1	Remember Co1	, Types of Inheritance, Public, Private and Protected Inheritance, Virtual Base Class, Constructor and Destructor in Inheritance, Containership	Lecture method, diagrams
4.1	UnderstandingCo2	Introduction, File Streams, Opening and Closing a File, End of File, Random Access, Command Line Arguments,	Lecture method, diagrams
5.1	Apply Co3	Introduction , Components of STL , Containers , Algorithms , Iterators ,Application of Container Classes Function Objects	Lecture method
2	Remember Co1		
1.2	Understanding Co2	C++ Character Set, C++ Tokens,	Lecture method,

		Variables, Data Types, Qualifiers, Range of Data Types, Programming Examples	
2.2	Remember Co1	Working with Class, Structure in C++ ,Accessing , Private Data Passing and Returning Object ,Array of Object ,Friend Function ,Static , Class Members ,Constant Member Function	Lecture method,
3.2	Analysing Co4	Pointer to Objects, The This Pointer, What is Binding in C++? , Virtual Functions ,Working of a Virtual Function	Lecture method,
4.2	Evaluation Co5	Working with Binary Mode Error Handling,Introduction , Function Template , Class Template	Lecture method,
5.2	Apply Co3	Creating (string) Objects , Manipulating String Objects , Relational Operations,	Lecture method,
3	WORKING WITH INHERITANCE IN C++:		
1.3	Remember	Your First C++ Program, Structure of a C++ Program, Styles of, Writing C++ Programs,	Lecture method, charts
2.3	Understand	Introduction, Constructor, Implicit and Explicit Call to Constructor, Dynamic Initialization of Objects, Dynamic Constructor, Destructor	Lecture method, charts
3.3	Understand	,Rules for Virtual Function ,Pure Virtual Function and Abstract Class ,Object Slicing ,Some Facts about Virtual Function ,Virtual Destructor	Lecture method, charts
4.3	Analyse Co4	Basics of Exception Handling , Exception Handling Mechanism , Programming Examples	Lecture method, charts
5.3	Analyse Co4	String Characteristics , Accessing Characters in Strings , Comparing and Swapping	Lecture method
1.3	Evaluation Co6	Operators and Expressions, Declaring Constants, Unconditional Branching Using Goto , Introduction to Looping	Lecture method

		Pointer and Arrays		
2.4	Remember	Introduction, Operator Overloading with Binary Operator Overloading, Overloading Using Friend Function, Conversion Type	Lecture method
3.4	Understand	Introduction, C++ Stream Classes, Unformatted Input/Output,	Lecture method
4.4	Understand	,Exception Handling with Class Catching all Exceptions , Specifying Exception for a Function	Lecture method
5.4	Analyse Co4	New Data Types , New Operators , Class Implementation ,	Lecture method
	Analyse Co4	Scope Resolution , Reference Variables, The Bool Data Type, The Operator New and Delete	
2.5	Evaluation Co6	WAP to create a simple calculator, convert seconds into hours, minutes and seconds, to find the volume of a square, cone, and rectangle	Lab
3.5	Evaluation Co6	Formatted Input /Output Operations, Manipulators	
4.5	Create	WAP using friend function, copy constructor, to allocate memory dynamically ,using Constructor	Demo
5	INTRODUCTION TO THE STANDARD TEMPLATE LIBRARY		
5.5	Remember	Namespace Scope , Operator Keywords , New Keywords , New Headers	Demo
1.4	Understand	WAP to create a simple calculator, convert seconds into hours, minutes and seconds, to find the volume of a square, cone, and rectangle	
2.6	Understand	WAP to find the greatest of three numbers, even and odd n natural numbers, generate all the prime	Lab
3.6	Analyse Co4	WAP for Structure to design a class having static member function	

4.6	Analyse Co4	WAP that illustrate inheritance.WAP illustrating the use of virtual functions in class.	Lab
5.6	Evaluation Co6	WAP to implement the exception handling , to create Simple calculator using Class template	Lab

Course: **Web Applications Development**

Units :

1. Internet and the World Wide Web.
2. HTML Page Layout.
3. JavaScript.
4. PHP
5. Advanced PHP

	Title	Unit Outcomes	Teaching Method
1	**Internet and the World Wide Web.**		
1.1	Remember Co1	Describe and Define the Internet and the World Wide Web.	Lecture method, rote method
1.2	Remember Co1	Discuss and explain basic concepts of internet and World Wide Web and HTML5,CSS	Lecture method, rote method
	Apply Co3	Write Markup tags and Program	Demonstration
1.3	Remember Co1	Use HTML Program and Write Program for the Web Pages and Practice	Lecture method, rote method Demonstration
	Remember Co1	Practice and solve the program problems	Lecture method, rote method
1.4	Remember Co1 Apply Co3	Differentiate and compare the theory and practical's (HTML,CSS)	Lecture method, rote method Demonstration
1.5	Remember Co1 Understanding Co2	Organizing and planning Design and create the Web Pages	Lecture method, Explanation, Demonstration
2	**HTML Page Layout.**		
2.1	Remember Co1 Understanding Co2	Describe and Define the HTML Page Layout.	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	Discuss and explain the HTML Media, Tables and forms.	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	Write Markup tags and Program	Lecture method, rote method; Explanation Solve Demonstration
2.4	Analysing Co4	Use HTML Program and Write Program for the Web Pages and Practice	Demonstration
2.5	Evaluation Co5	Revise and judge the theory and practical	Evaluation
3	**JavaScript**.		
3.1	Apply Co3	Describe and define the JavaScript	Lecture method, rote method

3.2	Apply Co3	Discuss and explain basic concepts of Operators,Statements,JavaScript Object and Event Handles Etc	Lecture method, rote method; Explanation Solve Demonstration
3.3	Remember Co1 Understand Co2 Demonstration Co4	Use Operators,Statements,JavaScript Object and Event Handles Etc for Program and design webpages.	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Differentiate and compare the theory and practical's	Lecture method, Explanation Demonstrate
4	**PHP and Advanced PHP**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Describe and define the PHP and Advanced PHP	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Describe and define the PHP syntax and Comments	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Discuss and explain the PHP syntax and Comments, variables and constants, Looping and Functions etc.	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Discuss and explain the PHP syntax and Comments, variables and constants, Looping and Functions etc.	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Evaluation Co5	Write Program for the Web Pages and Practice	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Evaluation Co5	Use PHP and MySQL and write program to connect MySQL	Lecture method, Explanation Demonstrate
4.4	Remember Co1 Understand Co2 Analyse Co4	Differentiate and compare the theory and practical's (PHP,MySQL)	Lecture method, Explanation Analyse Demonstrate
	Remember Co1 Understand Co2 Analyse Co4	Organizing and planning Design and create the Web Applications	Lecture method, Explanation Analyse Demonstrate
	Analyse Co4	Web application development	Explanation Analyse Demonstrate
	Evaluation Co5	Revise and judge the theory and practical	Evaluation
	Evaluation Co5	Revise and judge the theory and practical	Evaluation

Course: Applied Mathematics

Units :

1. Matrix and Complex Numbers
2. Linear Differential Equation
3. The Laplace Transform and Inverse Laplace Transform
4. Multiple Integrals and Application of Integration
5. Beta, Gama, Error Function and Differentiation Under Integral Sing

	Title	Unit Outcomes	Teaching Method
1	Matrix and Complex Numbers		
1.1	Remember Co1	Define Matrix, Types of Matrix	Lecture method, PPT
1.2	Remember Co1	Inverse of a matrix, Properties of matrices	Lecture method, PPT
	Apply Co3		Lecture method, PPT
1.3	Remember Co1	Linear equations, Linear dependence and linear independence of vectors, Linear transformation	Lecture method, PPT
	Remember Co1	Complex number, Equality of complex numbers, Definition of hyperbolic function, Relations between circular and hyperbolic functions, Inverse hyperbolic functions	Lecture method, PPT
1.4	Remember Co1 Apply Co3	Characteristics roots and characteristics vectors	Lecture method, PPT
1.5	Remember Co1 Understanding Co2	Mathematical operation with complex numbers and their representation on Argand's Diagram, Circular functions of complex angles, , Differentiation and Integration	Lecture method, PPT
2	Linear Differential Equation		
2.1	Remember Co1 Understanding Co2	Introduction, The Differential Operator, Linear Differential Equation f(D) y = 0,	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	Separation of variables, Equations homogeneous in x and y, Non-homogeneous linear equations, Exact differential Equation, Integrating Factor, Linear Equation and equation reducible to this form, Method of substitution	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	Differential equation of the first order of a degree higher than the first	Lecture method, rote method; Explanation Solve
2.4	Analysing Co4	Different cases depending on the nature of the root of the equation f(D) = 0, Linear differential equation f(D) y = X,	Demonstration

		The complimentary Function, The inverse operator 1/f(D) and the symbolic expiration for the particular integral 1/f(D) X	
2.5	Evaluation Co5	Particular integral : Short methods, Particular integral : Other methods, Differential equations reducible to the linear differential equations with constant coefficients.	Evaluation
3	The Laplace Transform and Inverse Laplace Transform		
3.1	Remember Co1 Understand Co2 Demonstration Apply Co3	Introduction, Definition of the Laplace Transform, Table of Elementary Laplace Transforms Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, The Convolution Theorem,	Demonstrate
3.2	Apply Co3	Laplace Transform of an Integral, Laplace Transform of Derivatives	Demonstrate
3.3	Remember Co1 Understand Co2 Demonstration Co4	Definition of the Inverse Laplace Transform, Table of Elementary Inverse Laplace Transforms, Shifting Theorem, Partial fraction Methods, Use of Convolution Theorem, Solution of Ordinary Linear Differential Equations with Constant Coefficients	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Solution of Simultaneous Ordinary Differential Equations, Laplace Transformation of Special Function, Periodic Functions, Heaviside Unit Step Function, Dirac-delta Function(Unit Impulse Function),	Lecture method, Explanation
4	Multiple Integrals and Application of Integration		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Double Integral, Change of the order of the integration, Double integral in polar co-ordinates	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Triple integrals.	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4 Apply Co3	Applications of integration: Areas, Volumes of solids.	Lecture method, Explanation Demonstrate
5	Beta, Gama, Error Function and Differentiation Under Integral Sing		
5.1	Remember Co1 Understand Co2 Evaluation Co5	Beta Functions – Definitions, Properties and Problems. Duplication formula	Lecture method, Explanation Evaluation

5.2	Remember Co1 Understand Co2 Evaluation Co5	Gamma Functions – Definitions, Properties and Problems. Duplication formula -	Lecture method, Explanation Evaluation
5.3	Remember Co1 Understand Co2 Evaluation Co5	Differentiation Under the Integral Sign	Lecture method, Explanation Evaluation
5.4	Remember Co1 Understand Co2 Analyse Co4	Error Functions – Definitions, Properties and Problems	Lecture method, Explanation Analyse

Course: COMPUTER NETWORKS

Course Objectives: • To Understand Basic Concepts of Networking.

• To Understand Working of Network Layer Architecture.

• To Learn Practical Implementation of Basic Routing Algorithms.

• To Learn Different Networking Protocols.

	Title	Unit Outcomes	Teaching Method
1			
1.1	Remember Co1	Introduction: Networking standards and Administrations, networks, network types – LAN, MAN, WAN. Network Models: The OSI model, TCP/IP protocol suite,	Lecture method, ppt method
1.2	Remember Co1	Introduction to Physical layer: Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance. Digital transmissions: Digital-to-digital conversion, analog-to-digital conversion, transmission modes	Lecture method, ppt
1.3	Remember Co1 Understanding Co2	Analog transmissions: digital-to-analog conversion, analog-to-analog conversion.	Lecture method, ppt
1.4	Remember Co1 Understanding Co2	Bandwidth Utilization – Multiplexing and Spectrum spreading: Multiplexing, Spread Spectrum	Lecture method, ppt
1.5	Remember Co1 Understanding Co2	Transmission media: Guided Media, Unguided Media Switching: Introduction, Circuit Switched Network, Packet Switching.	Lecture method, Explanation,
2.1	Remember Co1 Understanding Co2	Introduction to Data Link Layer: Link layer addressing, Data Link Layer Design Issues. Error detection and correction: -Block coding, cyclic codes, checksum, forward error correction, error correcting codes, error detecting codes.	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	Data Link Control: DLC services, data link layer protocols, HDLC, Pointto-point protocol. Media Access Control: Random access, controlled access, channelization,	Lecture method, Explanation
2.3	Remember Co1 Understanding Co2 Apply Co3	Wired LANs – Ethernet: Ethernet Protocol, standard Ethernet, fast Ethernet, gigabit Ethernet, 10 gigabit Ethernet Wired Network: Telephone Network, Cable Network, SONET, ATM Wireless LANs: Introduction, IEEE 802.11 project, Bluetooth, WiMAX, Cellular telephony, Satellite networks.	Lecture method, Explanation ppt

2.4	Remember Co1 Understanding Co2	Introduction to Network Layer: Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets	Lecture method, ppt
	Remember 1Analysing Co4	Network Layer Protocols : Internet Protocol, ICMPv4, Mobile IP	
3.1	Remember Co1 Understanding Co2	, Unicast Routing: Introduction, routing algorithms, unicast routing protocols. Next generation IP: IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition from IPv4 to IPv6. Introduction to the Transport Layer: Transport Layer Protocol, User Datagram Protocol, Transmission Control Protocol, SCTP.	Demonstrate
3.2	Remember Co1 Understanding Co2	Introduction to Application Layer: Client Server Programming, Iterative Programming. Standard Client-Server Protocols: WWW, HTTP, FTP, Electronic Mail, TELNET, Secure Cell, DNS	Demonstrate
3.3	Remember Co1 Understand Co2	SNMP Quality of Service: Data Flow to improve QoS, Flow control to improve QoS, Integrated service (Intserv), Differentiated Service(Diffserv)	Lecture method, Explanation

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Course: Data Structure

1. Used Diagrams
2. Used Tree and Graphs

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1	Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Data structure vs. File Organization, Operations on Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm,	Lecture method
1.2	Remember Co1	Introduction, Operations on the Stack Memory Representation of Stack	Lecture method, Diagrams
	Apply Co3	Operations on Stacks and Arrays	diagrams and charts
1.3	Remember Co1	Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, 12 7 Binary, Indexed Sequential Searches, Binary Search.	Lecture method, rote method
	Remember Co1	Binary Search.	Lecture method, rote method
1.4	Remember Co1 Apply Co3	Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, 12 7 Binary, Indexed Sequential Searches, Binary Search.	Lecture method, rote method diagrams and charts
1.5	Remember Co1 Understanding Co2	Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing	Lecture method, Explanation
2	Linked list		
2.1	Remember Co1 Understanding Co2	Asymptotic Analysis and Notations, Big O Notation, Big Omega Notation, Big Theta Notation, Rate of Growth and Big O Notation.	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List, Two way Linked List	Lecture method, rote method; Explanation Solve
2.3	Remember Co1	Array Representation of Stack, Applications of Stack, Evaluation of	Lecture method, rote method; Explanation

		Understanding Co2 Apply Co3	Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion.	
2.4		Analysing Co4	Tree: Tree, Binary Tree, Properties of Binary Tree, Memory Representation of Binary Tree, Operations Performed on Binary Tree, Reconstruction of Binary Tree from its Traversals, Huffman Algorithm, Binary Search Tree	Explanation
2.5		Evaluation Co5	Quadratic, Double hashing, Bucket hashing, Deletion and rehashing	Evaluation
3		stack		
3.1		Apply Co3	Introduction, Operations on the Stack Memory Representation of Stack	Diagrams
3.2		Apply Co3	Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, 12 7 Binary, Indexed Sequential Searches, Binary Search.	Lecture method, rote method; Explanation Solve
3.3		Remember Co1 Understand Co2 Demonstration Co4	Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing	Lecture method, Explanation Demonstrate
3.4		Remember Co1 Understand Co2	Address calculation techniques, Common hashing functions Collision resolution, Linear probing	Lecture method, Explanation
	4	Tree		
4.1		Remember Co1 Understand Co2 Demonstration Co4	Sparse Arrays, Sparse Matrix, Memory Representation of Special kind of Matrices, Advantages and Limitations of Arrays.	Lecture method, Explanation Demonstrate
		Remember Co1 Understand Co2 Demonstration Co4	Advanced Tree Structures: Red Black Tree, Operations Performed on Red Black Tree	Lecture method, Explanation Demonstrate
4.2		Remember Co1 Understand Co2 Demonstration Co4	Operations Performed on Graph, Graph Traversal, Applications of the Graph	Lecture method, Explanation Demonstrate
		Remember Co1 Understand Co2 Demonstration Co4	Quadratic, Double hashing, Bucket hashing, Deletion and rehashing	Lecture method, Explanation Demonstrate
		Remember Co1 Understand Co2	Reachability, Shortest Path Problems, Spanning Trees.	Lecture method, Explanation

	Demonstration Co4		Demonstrate
4.3	Remember Co1 Understand Co2 Evaluation Co5	Operations on Binary Search Tree, Heap, Memory Representation of Heap, Operation on Heap, Heap Sort.	Lecture method, Explanation Evaluation
	Remember Co1 Understand Co2 Evaluation Co5	Traversing a Two way Linked List, Searching in a Two way linked List, Insertion of an element in Two way Linked List, Deleting a node from Two way Linked List, Header Linked List, Applications of the Linked list	Lecture method, rote method; Explanation Solve
	Remember Co1 Understand Co2 Evaluation Co5	Graph: Introduction, Graph, Graph Terminology, Memory Representation of Graph, Adjacency Matrix Representation of Graph, Adjacency List or Linked Representation of Graph	Lecture method, Explanation Evaluation
4.4	Remember Co1 Understand Co2 Analyse Co4	Circular Queue, Some special kinds of queues, Deque, Priority Queue, Application of Priority Queue, Applications of Queues.	Lecture method, Explanation Analyse
	Remember Co1 Understand Co2 Analyse Co4	, AVL Tree, Operations performed on AVL Tree, 2-3 Tree, B-Tree.	Lecture method, Explanation Analyse
	Analyse Co4	Operations on Binary Search Tree, Heap, Memory Representation of Heap, Operation on Heap, Heap Sort.	Diagram
	Evaluation Co5	Circular Queue, Some special kinds of queues, deque, Priority Queue, Application of Priority Queue, Applications of Queues.	Evaluation
	Evaluation Co5	Reachability, Shortest Path Problems, Spanning Trees.	Explanation
5	Graph		
51	Remember Co1	Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Data structure vs. File Organization, Operations on Data Structure, Algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm,	Lecture method
5.2	Remember Co1	Introduction, Operations on the Stack Memory Representation of Stack	Lecture method, Diagrams

	Apply Co3	Operations on Stacks and Arrays	diagrams and charts
5.3	Remember Co1	Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, 12 7 Binary, Indexed Sequential Searches, Binary Search.	Lecture method, rote method
	Remember Co1	Binary Search.	Lecture method, rote method
5.4	Remember Co1 Apply Co3	Bubble, Selection, Insertion, Merge Sort. Searching: Sequential, 12 7 Binary, Indexed Sequential Searches, Binary Search.	Lecture method, rote method diagrams and charts
5.5	Remember Co1 Understanding Co2	Hash function, Address calculation techniques, Common hashing functions Collision resolution, Linear probing	Lecture method, Explanation

Course: Bsc.IT DBMS

Units :

1. Introduction to Databases and Transactions
2. Data Models
3. Database Design, ER Diagram and Unified Modeling Language
4. Relational database model
5. Relational Algebra and Calculus
6. Calculus:
7. Constraints, Views and SQL
8. Transaction management and Concurrency
9. PL-SQL

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1	Describe Concept of Database Conceptual modelling and database design Database Design theory and normalization and introduction to keywords of language	Lecture method, note method
1.2	UNDERSTANDING CO2	Demonstrate relation of database model, calculating problems ,discussing & recognising Data modelling using the Entity Relationship model (ER).The enhanced entity relationship model. EXPLAIN Relational database design and further dependencies.	Lecture method, Presentation, Group Discussion.
	APPLYING CO3	Demonstrating, Calculating and relating relational algebra queries for a given set of relations, experiment on sql, design relational data base, use concurrency and recovery technique pl sql	Research in methodology, partials activities.
1.3	ANALYSING CO4	Testing constraints and inspecting view of database, differentiate: functional dependencies and Normalization debate on normalization, question on pl-sql Inspect and categorizing transaction management.	Revision From Different point of You Creating Stimulation
	EVALUATING CO 5	Conclude dbms, revise, revise RD, compare with real EG, summarize transaction management.	Real Life Example
1.4	CREATING CO6	sql quaries, uml diagram, plan, developing designing own database, deriving procedures in sql	Stimulation, Innovation

Python Programming

		Title	Unit Outcomes	Teaching Method
	1	Introduction (Python Programming)		
	1.1	Uo1(Remember) Co1	Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Data structure vs. File Organization, Operations on Data Structure,	Lecture method, diagrams
	1.2	UO2 (Understanding)Co1	Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets,	Lecture method,
	1.3	UO3 (Apply)Co3	Braces, and Parentheses, Variables and Expressions Values and Types,	Lecture method, charts
	1.4	UO4 (Analyse)Co1	Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations. Conditional Statements: if, if-else, nested if –else	Lecture method
	1.5	UoS5(evaluate)Co1 Understanding Co2	class test, MCQ,	projector, ppt
	1.6	U0S6(create)Co1 Understanding Co2	: Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.	
	2			
	2.1	Uo1(Remember) Co1	Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions,	Lecture method, diagrams

2.2	UO2 (Understanding)Co1	Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void	Lecture method,
2.3	UO3 (Apply)Co3	Incremental Development, Composition, Boolean Functions, more Recursion, Leap of Faith, Checking Type	Lecture method, charts
2.4	UO4 (Analyse)Co1 Understanding Co2	Methods, The in Operator, String Comparison, String	Lecture method
2.5	UoS5(evaluate)Co1 Understanding Co2	class test, MCQ,	projector, ppt
2.6	U0S6(create)Co1 Understanding Co2	Write a function that takes a character (i.e., a string of length 1) and returns True if it is a vowel, False otherwise.	Lecture method

3			

3.1	Uo1(Remember) Co1	Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions	Lecture method, diagrams
3.2	UO2 (Understanding)	Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator,	Lecture method,
3.3	UO3 (Apply)Co3	Creating a Dictionary, Accessing Values in a dictionary, updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary	Lecture method, charts
3.4	UO4 (Analyse)Co1	Files: Text Files, The File Object Attributes, Directories Exceptions: Built-in Exceptions, Handling Exceptions, Exception	Lecture method
3.5	UoS5(evaluate)	class test, MCQ,	projector, ppt

3.6	U0S6(create)	Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements	Lecture method

4			
4.1	Uo1(Remember) Co1	– Concept of regular expression, various types of regular expressions, using match function.	Lecture method, diagrams
4.2	UO2 (Understanding)Co1	Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values, Built-in Class Attributes,	Lecture method,
4.3	UO3 (Apply)Co3	Multithreaded Programming: Thread Module, creating a thread, synchronizing threads, multithreaded priority queue	Lecture method, charts
4.4	UO4 (Analyse)Co1 Understanding Co2	Modules: Importing module, Creating and exploring modules, Math	Lecture method
4.5	UoS5(evaluate)Co1 Understanding Co2	class test, MCQ,	projector, ppt
4.6	U0S6(create)Co1 Understanding Co2	Write a Python script to sort (ascending and descending) a dictionary by value.	Lecture method

5			
5.1	Uo1(Remember) Co1	Button, Canvas, Check button, Entry, Frame, Label, List box, Menu button, Menu, Message, Radio button, Scale, Scrollbar, text, Top-level, Spin box, Paned Window, Label Frame, tkMessagebox.	Lecture method, diagrams
5.2	UO2 (Understanding)Co1	Layout Management: Designing GUI applications with proper Layout Management features. Look and Feel Customization: Enhancing Look and Feel of GUI	Lecture method,

5.3	UO3 (Apply)Co3	Storing Data in Our MySQL Database via Our GUI: Connecting to a MySQL database from Python, Configuring the MySQL connection, Designing the Python GUI database, Using the INSERT	Lecture method, charts
5.4	UO4 (Analyse)Co1 Understanding Co2	Using the UPDATE command, Using the DELETE command, Storing and retrieving data from MySQL database	Lecture method
5.5	UoS5(evaluate)Co1 Understanding Co2	class test, MCQ,	projector, ppt
5.6	U0S6(create)Co1 Understanding Co2	Design a class that store the information of student and display the same	Lecture method

Course: COMPUTER GRAPHICS & ANIMATION

Units :

1. Introduction to Computer Graphics
2. Two-Dimensional Transformations:
3. Viewing in 3D
4. Visible-Surface Determination:
5. Computer Animation:

	Title	Unit Outcomes	Teaching Method
1	Introduction to Computer Graphics		
1.1	Remember Co1 Understanding Co2	Introduction to Computer Graphics: Overview of Computer Graphics, Computer Graphics Application and Software.	PPT, video
1.2	Remember Co1 Understanding Co2	Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays	Lecture method, PPT
1.3	Understanding Co2 Apply Co3	Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.	Lecture method, PPT
1.4	Remember Co1 Understanding Co2 Apply Co3	Scan conversion – Digital Differential Analyzer (DDA) algorithm, Bresenhams' Line drawing algorithm. Bresenhams' method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines.	Lecture method, Notes, solve
1.5	Remember Co1 Apply Co3	Scan Converting Circles, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland and Liang-Barsky, Clipping Polygons, problem with multiple components. 12 II Two-Dimensional Transformations	Lecture method, Notes, PPT, solve
2	Two-Dimensional Transformations:		
2.1	Remember Co1 Understanding Co2	Two-Dimensional Transformations: Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations.	Lecture method, Explanation , PPT
2.2	Remember Co1 Understanding Co2 Apply Co3	Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Transformation of Points, Transformation of The Unit Square, Solid Body Transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, The Window-to-Viewport Transformations.	Lecture method, Explanation

2.3	Understanding Co2 Apply Co3	ThreeDimensional Rotation, Three-Dimensional Reflection, ThreeDimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space.	Lecture method, Explanation, apply
2.4	Analysing Co4	Reflection through an Three-Dimensional Transformations: Three-Dimensional Scaling, Three-Dimensional Shearing, Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Affine and Perspective Geometry, Perspective Transformations,	Demonstration ,PPT
2.5	Apply Co3	Techniques for Generating Perspective Views, Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections.	Evaluation, PPT
3	Viewing in 3D		
3.1	Understand Co2 Remember Co1	Viewing in 3D Stages in 3D viewing, Canonical View Volume (CVV),	Explain
3.2	Understand Co2	Specifying an Arbitrary 3D View, Examples of 3D Viewing, The Mathematics of Planar Geometric Projections,	Explain, PPT
3.3	Remember Co1 Understand Co2 Analysing Co4	Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	. Light: Radiometry, Transport, Equation, Photometry Color: Colorimetry,	Lecture method, Explanation
3.5	Analysing Co4 Apply Co3	Color Spaces, Chromatic Adaptation, Color Appearance	Explanation , PPT
4		Visible-Surface Determination:	
4.1	Remember Co1 Understand Co2 Demonstration Co4	Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method.	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Painter's algorithms (depth sorting), Area sub-division method, BSP trees, Visible-Surface Ray Tracing, comparison of the methods.	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	Plane Curves and Surfaces: Curve Representation, Nonparametric Curves, Parametric Curves, Parametric Representation of a Circle, Parametric Representation of an	Lecture method, Explanation Demonstrate

		Ellipse.	
4.4	Understand Co2 Evaluation Co5 Creating Co6	Parametric Representation of a Parabola, Parametric Representation of a Hyperbola, Representation of Space Curves, Cubic Splines.	Lecture method, Explanation Evaluation
4.5	Understand Co2 Creating Co6	Bezier Curves, B-spline Curves, B-spline Curve Fit, B-spline Curve Subdivision, Parametric Cubic Curves, Quadric Surfaces. Bezier Surfaces.	Lecture method, Explanation Evaluation, Creating
5	Computer Animation:		
5.1	Remember Co1 Understand Co2 Analyse Co4	Principles of Animation, Key framing, Deformations, Character Animation,	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	Physics-Based Animation, Procedural Techniques, Groups of Objects.	Lecture method, Explanation Analyse
5.3	Analyse Co4	Image Manipulation and Storage: What is an Image? Digital image file formats, Image compression	Analyse
5.4	Understand Co2 Analyse Co4	JPEG, Image Processing - Digital image enhancement, contrast stretching,	Lecture method, Explanation
5.5	Understand Co2 Creating Co6	Histogram Equalization, smoothing and median Filtering.	Creating

Course: Computer Oriented Statistical Techniques
Units :

1. Understand the concept of Measures of Central Tendency and Measures of Dispersion
2. Understand the concept of Elementary Probability Theory and Sampling Theory
3. Understand the concepts through program implementation.
4. Small Sampling Theory and The Chi-Square Test
5. Curve Fitting and the Method of Least Squares and Correlation Theory

	Title	Unit Outcomes	Teaching Method
1	Understand the concept of Measures of Central Tendency and Measures of Dispersion		
1.1	Remember Co1	To understand what is Mean, Median, Mode, and Other Measures of Central Tendency	Lecture method
1.2	Remember Co1 Understanding Co2	How to Compare Mean, Median, and Mode, The Geometric Mean G, The Harmonic Mean H ,The Relation Between the Arithmetic, Geometric, and Harmonic Means	Lecture method, Diagram ,rote method
1.3	Apply Co3	Introduction to R Programming Basic syntax, data types, variables, operators, control statements, R-functions, R –Vectors, R – lists, R Arrays.	Lecture method, Explanation
1.4	Remember Co1 Understanding Co2	To understand The Standard Deviation and Other Measures of Dispersion	Lecture method, Explanation ,Execution
1.5	Remember Co1 Understanding Co2	To learn Properties of the Standard Deviation, Charlie's Check, Sheppard's Correction for Variance	Lecture method, rote method
2	Understand the concept of Elementary Probability Theory and Sampling Theory		
2.1	Remember Co1 Understanding Co2	To understand what is Moments , Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis.	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	To learn Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis.	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	To Understand and solve examples of the Probability, Conditional Probability; Independent and Dependent Events, Mutually Exclusive Events, Probability Distributions.	Lecture method, rote method; Explanation Solve
3	Understand the concepts through program implementation.		
3.1	Remember Co1 Understanding Co2	To understand Statistical Estimation Theory, Estimation of Parameters, Unbiased Estimates, Efficient Estimates, Point Estimates and Interval Estimates	Lecture method, rote method; Explanation Solve

3.2	Remember Co1 Understanding Co2	To understand Statistical Decision Theory, Statistical Decisions, Statistical Hypotheses, Tests of Hypotheses and Significance	Lecture method, rote method; Explanation Solve
3.3	Apply Co3	Write a program for mean, median, mode, Frequency Distribution in R.	Demonstrate
3.4	Apply Co3	Write a program for Normal Distribution , Binomial Distribution, Frequency Distribution in R.	Demonstrate
4	Small Sampling Theory and The Chi-Square Test		
4.1	Remember Co1 Understanding Co2	To understand Small Samples, Student's t Distribution, Confidence Intervals	Lecture method, Explanation
4.2	Remember Co1 Understanding Co2	To learn Tests of Hypotheses and Significance, The Chi- Square Distribution, Confidence Intervals for Sigma , Degrees of Freedom, The F Distribution.	Lecture method, Explanation
4.3	Remember Co1 Understanding Co2	To understand chi-square, Significance Tests, The Chi-Square Test for Goodness of Fit, Contingency Tables, Yates' Correction for Continuity	Lecture method, Explanation
4.4	Remember Co1 Understanding Co2 Apply Co3	To learn Simple Formulas for Computing chi-square, Coefficient of Contingency, Correlation of Attributes, Additive Property of chi- square.	Lecture method, rote method; Explanation Solve
4.5	Apply Co3	Write a Program in R for Tests of Hypotheses and chi-square	Demonstrate
5	Curve Fitting and the Method of Least Squares and Correlation Theory		
5.1	Remember Co1 Understanding Co2	To Understand Curve Fitting, Equations of Approximating Curves, Freehand Method of Curve Fitting	Lecture method, Explanation
5.2	Remember Co1 Understanding Co2	To understand The Straight Line, The Method of Least Squares, The Least-Squares Line, Nonlinear Relationships, The Least-Squares Parabola, Regression, Applications to Time Series	Lecture method, Explanation
5.3	Apply Co3	Solve Examples Involving More Than Two Variables.	Lecture method, rote method; Explanation Solve
5.4	Remember Co1 Understanding Co2 Apply Co3	To learn Correlation and Regression, Linear Correlation, Measures of Correlation, The Least-Squares Regression Lines, Standard Error of Estimate, Explained and Unexplained Variation, Coefficient of Correlation	Lecture method, rote method; Explanation Solve
5.5	Apply Co3	Write a Program in R for correlation and regression line	Demonstrate

Course: Software Engineering

Units :

1. Apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.
2. An ability to work in one or more significant application domains.
3. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.
4. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.
5. Demonstrate an ability to use the techniques and tools necessary for engineering practice.

	Title	Unit Outcomes	Teaching Method
1	Introduction:		
1.1	Remember Co1 Understanding Co2	software engineering, Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance	Lecture method, PPT
1.2	Remember Co1 Understanding Co2	Functional and Non-functional requirements, User Requirements, System Requirements	Lecture method, PPT
1.3	Understanding Co2 Apply Co3	Interface Specification, Documentation of the software requirements	Lecture method, PPT
1.4	Remember Co1 Understanding Co2 Apply Co3	Software Process and Project, Component Software Processes	Lecture method, Notes, solve
1.5	Remember Co1 Apply Co3	Software Development Process Models. Waterfall Model, Prototyping, Iterative Development, Rational Unified Process, The RAD Model, Time boxing Model	Lecture method, Notes, PPT, solve
1.6	Remember Co1 Understanding Co2	Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods.	
2	Socio-technical system		
2.1	Remember Co1 Understanding Co2	Essential characteristics of socio technical systems, Emergent System Properties, Systems Engineering, Components of system such as organization, people and computers, Dealing Legacy Systems.	Lecture method, Explanation, PPT
2.2	Remember Co1 Understanding Co2 Apply Co3	Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems.	Lecture method, Explanation
2.3	Understanding Co2 Apply Co3	Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management.	Lecture method, Explanation, apply
2.4	Analysing Co4	System Models and its types, Context Models, Behavioural Models, Data Models, Object Models, Structured Methods.	Demonstration, PPT

3	Architectural Design		
3.1	Understand Co2 Remember Co1	Architectural Design Decisions, System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures.	Explain
3.2	Understand Co2	Need of UI design, Design issues, The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation.	Explain, PPT
3.3	Remember Co1 Understand Co2 Analysing Co4	Software Project Management, Management activities, Project Planning, Project Scheduling, Risk Management.	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Process and Product Quality, Quality assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics.	Lecture method, Explanation
4	Verification and Validation		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods.	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	System Testing, Component Testing, Test Case Design, Test Automation	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Software Measurement: Size-Oriented Metrics, Function-Oriented Metrics, Extended Function Point Metrics	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	Software Cost Estimation: Software Productivity, Estimation Techniques, Algorithmic Cost Modelling, Project Duration and Staffing	Lecture method, Explanation Demonstrate
5	Process Improvement		
5.1	Remember Co1 Understand Co2 Analyse Co4	Process and product quality, Process Classification, Process Measurement, Process Analysis and Modelling, Process Change, The CMMI Process Improvement Framework.	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	Service Oriented Software Engineering: Services as reusable components, Service Engineering, Software Development with Services.	Lecture method, Explanation Analyse
5.3	Analyse Co4 Understand Co2	Software reuse landscape, Application frameworks, Software product lines, COTS product reuse.	Analyse Explanation
5.4	Understand Co2 Analyse Co4	Distributed systems issues, Client–server computing, Architectural patterns for distributed systems, Software as a service	Lecture method, Explanation

Course: CoreJava

Units :

1. **Introduction**
2. **Control Flow Statement**
3. **Inheritance**
4. **Enumeration**
5. **Event Handling**

	Title	Unit Outcomes	Teaching Method
1	**Introduction**		
1.1	Remember Co1	**Introduction:** History, Features of Java, Java Development Kit, Java Application Programming Interface, Java Virtual Machine Java Program Structure, Java Tokens.	Lecture method, rote method
1.2	Remember Co1	**OOPS:** Introduction, Class, Object, Static Keywords, Constructors, this keyword, Inheritance, Inner class	Lecture method, rote method
	Apply Co3	Anonymous Inner class, super keyword, Polymorphism (overloading and overriding), Abstraction, Encapsulation, Abstract Classes, Interfaces	diagrams and charts
1.3	Remember Co1	Compiler And Interpreter, java programs, java applications, main(), public, static, void, string[] args, statements, white space, case sensitivity,	Lecture method, rote method
	Remember Co1	User Defined Packages, Access specifiers	Lecture method, rote method
1.4	Remember Co1 Apply Co3	primitive data types, Object Reference Types, Strings, Auto boxing, operators and properties of operators, Arithmetic operators, assignment operators	Lecture method, rote method diagrams and charts
1.5	Remember Co1 Apply Co3	increment and decrement operator, relational operator, logical operator, bitwise operator, conditional operator	Lecture method, Explanation
2.	**Control Flow Statement**		
2.1	Remember Co1	Control Flow Statements: The If…Else If…Else Statement, The Switch…Case Statement	Lecture method, rote method
2.2	Remember Co1	Iterations: The While Loop, The Do … While Loop, The For Loop, The Foreach Loop, Labeled Statements, The Break And Continue Statements, The Return Statement	Lecture method, rote method
2.3	Remember Co1	Classes: Types of Classes, Scope Rules, Access Modifier, Instantiating Objects	Lecture method, rote method

		From A Class, Initializing The Class Object And Its Attributes, Class Methods, Accessing A Method, Method Returning A Value	diagrams and charts
2.4	Remember Co1	Method's Arguments, Method Overloading, Variable Arguments [Varargs], Constructors, this Instance, super Instance,	Lecture method, rote method
2.5	Remember Co1 Apply Co3	Characteristics Of Members Of A Class, constants, this instance, static fields of a class, static methods of a class, garbage collection	Lecture method, rote method
3	Inheritance		
3.1	Remember Co1	Inheritance: Derived Class Objects, Inheritance and Access Control, Default Base Class Constructors, this and super keywords. Abstract Classes And Interfaces, Abstract Classes, Abstract Methods, Interfaces, What Is An Interface?	Lecture method, Explanation ppt
3.2	Remember Co1	How Is An Interface Different From An Abstract Class?, Multiple Inheritance, Default Implementation, Adding New Functionality, Method Implementation	Lecture method, rote method ppt
3.3	Remember Co1 Apply Co3	Classes V/s 12 26 Interfaces	Lecture method, rote method
3.4	Remember Co1	Defining An Interface, Implementing Interfaces	Lecture method, rote method
3.5	Remember Co1 Apply Co3	Packages: Creating Packages, Default Package, Importing Packages, Using A Package	Lecture method, rote method
4	Enumerations,Arrays		
4.1	Remember Co1 Apply Co3	Two Dimensional Arrays, Multi-Dimensional Arrays, Vectors, Adding Elements To A Vector, Accessing Vector Elements, Searching For Elements In A Vector, Working With The Size of The Vector	Lecture method, rote method ppt
4.2	Remember Co1 Apply Co3	Multithreading: the thread control methods, thread life cycle, the main thread, creating a thread, extending the thread class.	Lecture method, rote method ppt
4.3	Remember Co1 Apply Co3	Exceptions: Catching Java Exceptions, Catching Run-Time Exceptions, Handling Multiple Exceptions, The finally Clause, The throws Clause	Lecture method, rote method
4.4	Remember Co1 Apply Co3	reading console input, writing console output, reading file, writing file, writing binary data	Lecture method, Explanation

4.5	Remember Co1 Apply Co3	reading binary data, getting started with character streams, writing file, reading file	Lecture method, rote method
5	Event Handling		
5.1	Remember Co1	Event Handling: Delegation Event Model, Events, Event classes, Event listener interfaces	Lecture method, rote method
5.2	Remember Co1	Using delegation event model, adapter classes and inner classes	Lecture method, rote method
5.3	Remember Co1 Apply Co3	Abstract Window Toolkit: Window Fundamentals, Component, Container, Panel, Window, Frame, Canvas.Components	Lecture method, rote method
5.4	Remember Co1	Labels, Buttons, Check Boxes, Radio Buttons, Choice Menus, Text Fields, Text, Scrolling List, Scrollbars, Panels, Frames	Lecture method, rote method
5.5	Remember Co1 Apply Co3	Layouts: Flow Layout, Grid Layout, Border Layout, Card Layout.	Lecture method, rote method

Course: Introduction to Embedded Systems
Units :

1. Introduction
2. Embedded Systems – Application and Domain Specific
3. The 8051 Microcontrollers
4. Designing Embedded System with 8051 Microcontroller
5. Real Time Operating System

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1	Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems.	Lecture method, Explanation
1.2	Remember Co1	Core of embedded systems: microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors.	PPT, Diagram, Explanation
1.3	Remember Co1	Application specific ICs, Programmable logic devices, COTS, sensors and actuators.	Real world example, Diagram, Explanation
1.4	Remember Co1 Apply Co3	Communication interface, embedded firmware, other system components.	Lecture method, Diagram ,Explanation
1.5	Remember Co1 Understanding Co2	Characteristics and quality attributes of embedded systems: Characteristics, operational and non-operational quality attributes.	Lecture method, Explanation
2	Embedded Systems – Application and Domain Specific		
2.1	Remember Co1 Understanding Co2	Application specific – washing machine, domain specific - automotive.	Lecture method, Real world example Diagram ,Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	Embedded Hardware: Memory map, i/o map, interrupt map, processor family, external peripherals.	Explain, PPT, Diagrams.
2.3	Remember Co1 Understanding Co2 Apply Co3	Memory – RAM , ROM, types of RAM and ROM, memory testing, CRC ,Flash memory.	Real world example. Diagram, Explanation
2.4	Analysing Co4	Peripherals: Control and Status Registers.	Lecture method, Diagram, Explanation
2.5	Evaluation Co5	Peripherals: Device Driver, Timer Driver - Watchdog Timers.	Lecture method, Diagram, Explanation
3	The 8051 Microcontrollers		
3.1	Apply Co3	Microcontrollers and Embedded processors, Overview of 8051 family.	Lecture method, Diagram, Explanation
3.2	Apply Co3	8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory.	Real world example. Diagram, Explanation

3.3	Remember Co1 Understand Co2 Demonstration Co4	8051 Programming in C: Data Types and time delay in 8051 C	Lecture method, PPT, Explanation, Table.
3.4	Remember Co1 Understand Co2	I/O Programming, Logic operations, Data conversion Programs	Lecture method, Explanation
4	Designing Embedded System with 8051 Microcontroller		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Designing Embedded System with 8051 Microcontroller, why 8051 Microcontroller	Lecture method, Explanation
4.2	Remember Co1 Understand Co2 Demonstration Co4	Designing with 8051.	Lecture method, Explanation
4.3	Remember Co1 Understand Co2 Demonstration Co4	Programming embedded systems: structure of embedded program,	Lecture method, Explanation
4.4	Remember Co1 Understand Co2 Demonstration Co4	infinite loop, compiling, linking and debugging.	Lecture method, Explanation Demonstrate
5	Real Time Operating System (RTOS)		
5.1	Remember Co1 Understand Co2 Evaluation Co5	Operating system basics, types of operating systems,	Lecture method, Explanation
5.2	Remember Co1 Understand Co2 Evaluation Co5	Real-Time Characteristics, Selection Process of an RTOS.	Explanation Evaluation
5.3	Remember Co1 Understand Co2 Evaluation Co5	Design and Development: Embedded system development Environment – IDE, types of file generated on cross compilation, disassembler/ de-compiler, simulator, emulator and debugging,	Real world example. Diagram ,Explanation
5.4	Remember Co1 Understand Co2 Analyse Co4	Embedded product development life-cycle, trends in embedded industry.	Lecture method, Explanation Analyse

Year : S.Y.Bsc. IT   Semester: IV   Course name: Introduction to Embedded Systems

		Course Outcome	Teaching Method Used
Co1		• Embedded Systems and general purpose computer systems • history, classifications, applications and purpose of embedded systems • Core of embedded systems- microprocessors and microcontrollers • RISC and CISC controllers • Big endian and Little endian processors • Application specific ICs, Programmable logic devices • COTS, sensors and actuators, communication interface, embedded firmware, other system components. • Characteristics, operational and non-operational quality attributes.	Lecture method, PPT, Diagram, Explanation Real world example
Co2		• Application and Domain Specific Embedded Systems • Application specific – washing machine, • domain specific - automotive. • Embedded Hardware: Memory map, i/o map, interrupt map, processor family, external peripherals, • memory – RAM , ROM, types of RAM and ROM, memory testing, CRC ,Flash memory. • Peripherals: Control and Status Registers, Device Driver, Timer Driver - Watchdog Timers.	Explanation , PPT, Diagrams. Real world example,
Co3		• Microcontrollers and Embedded processors, • Overview of 8051 family. • 8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory. • 8051 Programming in C: Data Types and time delay in 8051 C, I/O Programming, Logic operations, Data conversion Programs.	Lecture method, PPT, Explanation, Table. Diagrams. Real world example,
Co4		• Designing Embedded System with 8051 Microcontroller • Factors to be considered in selecting a controller • why 8051 Microcontroller, • Designing with 8051. • Programming embedded systems • structure of embedded program, infinite loop, compiling, linking and debugging.	Lecture method, Explanation Demonstrate
Co5		• Real Time Operating System (RTOS) • Operating system basics, types of operating systems, • Real-Time Characteristics, Selection Process of an RTOS. Design and Development	Lecture method, Explanation, Diagrams. Analyse

	• Embedded system development Environment – IDE, types of file generated on cross compilation, disassembler/ de-compiler, simulator, emulator and debugging, embedded product development life-cycle • trends in embedded industry.	

Course Outcomes:

1. CO 1= Understand basic concept of embedded systems. Acquire a basic knowledge about fundamentals of microcontrollers.

2. Co2 = Develop familiarity with 8051 Microcontrollers and their applications in an embedded environment.
3. Co3= Understand the concept of embedded system, microcontroller, different components of microcontroller and their interactions. Write the 8051 assembly language code for specific purposes.
4. Co4 = Understand the key concepts of embedded systems such as I/O, timers, interrupts and   interaction with peripheral devices
5 Co5 = Use modern engineering tools necessary for integrating software and hardware components in embedded system designs. Acquire knowledge about Life cycle of embedded design and its testing.

Mapping of Programme Outcomes and Course outcome

	Com.Sk	Basic knowdge	Solve the prob, Face Challenge	Apply techn	Team leader	ethics, social	Entrepreneurial skill	Total Points	Average Point
Co1	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 2	Yes 2	17	2.4
Co2	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 3	Yes 2	18	2.6
Co3	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 2	Yes 3	18	2.6
Co4	Yes 3	Yes 3	Yes 2	Yes 3	Yes 2	Yes 2	Yes 3	18	2.6
Co5	Yes 3	Yes 2	Yes 3	Yes 3	Yes 3	Yes 3	Yes 2	19	2.7
	15	14	11	15	11	12	12		
	3	2.8	2.2	3	2.2	2.4	2.4	17	12.9

12.9/5 = 2.58

17/7 = 2.57

Attainment and measuring outcomes

Attainment = Total of marks of all students in the course/total number of students

For ex:

Passing percentage

Attainment = 9375/117 = 80

Attainment Percentage

0-39 unacceptable

40-50 poor

51-60 acceptable

61-70 good

71-80 very good

81-and above   excellent

Graduate Attributes

1. Able to express and understand the opinions with efficient communication skills
2. Attain basic knowledge of various subjects and in depth knowledge in specialized subjects
3. Able to solve and provide solutions for various problems and Refined with competitiveness to face challenges
4. Able to understand and apply technology for improving efficiency in work
5. Able to lead the team and also work as a cooperative member of the team
6. Respecting and adopting morals, ethics and human values & Sensitized towards social and environmental aspects
7. Encouraged for Entrepreneurial and professional skills and awareness about opportunities for entrepreneurship.

Course: Software Project Management

Units:

1. To provide students with basic understanding of concepts of Software Project Management
2. To introduce students to the key activities performed by the management.
3. To provide an insight into the nature of activity planning, risk management and resource allocation.
4. To provide understanding of communication plans.
5. To understand project closure activity.

	Title	Unit Outcomes	Teaching Method
1	**Introduction to Software Project Management:**		
1.1	Remember Co1 Understanding Co2	Introduction, Why is Software Project Management Important? What is a Project? Software Projects versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered by Software Project Management,	Explanation, PPT, Flow charts.
1.2	Remember Co1	Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success and Failure, What is Management? Management Control, Project Management Life Cycle, Traditional versus Modern Project Management Practices.	Lecture method, rote method
1.3	Understanding Co2 Apply Co3	Understanding Project Evaluation and Programme Management.	Lecture method, Charts
1.4	Remember Co1 Understanding Co2	Understanding Introduction, Business Case, Project Portfolio Management, Evaluation of Individual Projects, Cost–benefit Evaluation Techniques, Risk Evaluation, Programme Management, Managing the Allocation of Resources	Lecture method, rote method
1.5	Remember Co1 Apply Co3	An Overview of Project Planning.	Lecture method, rote method
1.6	Remember Co1 Understanding Co2 Apply Co3	Introduction to Step Wise Project Planning, Step 0: Select Project, Step 1: Identify Project Scope and Objectives, Step 2: Identify Project Infrastructure, Step 3: Analyse Project Characteristics, Step 4: Identify Project Products and Activities, Step 5: Estimate Effort for Each Activity, Step 6: Identify Activity Risks, Step 7: Allocate Resources, Step 8: Review/Publicize Plan, Steps 9 and 10: Execute Plan/Lower Levels of Planning	Lecture method, Explanation
2	**Selection of an Appropriate Project Approach**		

2.1	Remember Co1 Understanding Co2	Introduction, Build or Buy? Choosing Methodologies and Technologies, Software Processes and Process Models	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	To understand Choice of Process Models, Structure versus Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping. Implementation of Process Models.	Lecture method, rote method; Explanation Solve
2.3	Understanding Co2 Apply Co3 Creating Co6	Understanding Where are the Estimates Done? Problems with Over- and Under-Estimates, The Basis for Software Estimating, Software Effort Estimation Techniques	Lecture method, Explanation, apply
2.4	Analysing Co4	Activities performed by the management.	Lecture method
2.5	Apply Co3	Concept implementation in overall planning process.	Evaluation
3	**Activity Planning**		
3.1	Understand Co2 Remember Co1	Understanding Objectives of Activity Planning, When to Plan, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models.	Lecture method, Explain diagram
3.2	Understand Co2	Understanding Formulating a Network Model, Adding the Time Dimension, The Forward Pass, Backward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities, Activity-on-Arrow Networks.	Explanation, Lecture method
3.3	Remember Co1 Understand Co2 Analysing Co4	Introduction, Risk, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, Risk Management, Evaluating Risks to the Schedule.	Lecture method, Explanation Example
3.4	Remember Co1 Understand Co2	Understanding Boehm's Top 10 Risks and Counter Measures, Applying the PERT Technique.	Lecture method, Explanation
3.5	Analysing Co4 Apply Co3	Understanding, Monte Carlo Simulation, Critical Chain Concepts.	Explanation
4	**Monitoring and Control**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Understanding Introduction, Creating the Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring.	Lecture method, Explanation
	Remember Co1 Understand Co2 Demonstration Co4	Managing Contracts: Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.	Lecture method, Explanation

4.2	Remember Co1 Understand Co2 Demonstration Co4	Getting the Project Back to Target, Change Control, Software Configuration Management.	Lecture method, Explanation
4.3	Remember Co1 Understand Co2 Demonstration Co4	Managing People in Software Environments, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation	Lecture method, Explanation
4.4	Understand Co2 Evaluation Co5 Creating Co6	Oldham–Hackman Job Characteristics Model, Stress, Stress Management, Health and Safety,	Lecture method, Explanation Evaluation
4.5	Understand Co2 Creating Co6	Understanding Some Ethical and Professional Concerns.	Lecture method, Explanation Evaluation, Creating
5	**Working in Teams**		
5.1	Remember Co1 Understand Co2 Analyse Co4	Working in Teams: Introduction, becoming a Team, Decision Making, Organization and Team Structures, Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leadership .	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	Understanding Software Quality: Introduction, The Place of Software Quality in Project Planning, Importance of Software Quality.	Lecture method, Explanation Analyse
5.3	Analyse Co4	Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product versus Process Quality Management, Quality Management Systems, Process Capability Models.	Analyse Techniques
5.4	Understand Co2 Analyse Co4	Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans.	Lecture method, Explanation
5.5	Understand Co2 Creating Co6	Project Closeout: Introduction, Reasons for Project Closure, Project Closure Process, Performing a Financial Closure, Project Closeout Report.	Implementation of Project

Course: Advanced web Programming

Units :

1. To gain Knowledge of the .NET Technologies Framework
2. To understand and implement Web Form Fundamentals and form Control
3. Learn the Error Handling, Logging and Tracing
4. To understand ADO.Net fundamentals
5. To learn working with XML and ASP/NET AJAX

	Title	Unit Outcomes	Teaching Method
1	Introduction .NET		
1.1	Remember Co1 Understanding Co2	.NET Frame work and C# , VB .NET Language and The Common Language Run Time The .NET Class Library	PPT
1.2	Remember Co1	Introduction to C#, Variables, Data Types	Lecture method, rote method
1.3	Understanding Co2 Apply Co3	Operator, Type Casting	Lecture method, PPT
1.4	Remember Co1 Understanding Co2	Object based Manipulation Conditional Logic and Loops	Lecture method, rote method
1.5	Remember Co1 Apply Co3	Object Oriented Programming	Lecture method, rote method
1.6	Remember Co1 Understanding Co2 Apply Co3	Value Types and reference Types Namespace and Assemblies, Advanced Class Programming	Lecture method, Explanation
2	Web Form Fundamentals		
2.1	Remember Co1 Understanding Co2	Web Application Fundamental Code-Behind class, Event handler	Lecture method, Explanation , PPT
2.2	Remember Co1 Understanding Co2 Apply Co3	Understanding the Anatomy of an ASP.NET Application, Introducing Server Controls, Using the Page Class	Lecture method, rote method; Explanation Solve
2.3	Understanding Co2 Apply Co3 Creating Co6	Using Application Events, Configuring an ASP.NET Application	Lecture method, Explanation, apply
	Form Control		
2.4	Analysing Co4	Web Controls, Web Control Classes, List Controls, Table Controls	Demonstration ,PPT
2.5	Apply Co3	Web Control Events and AutoPostBack, Validation, Understanding Validation, Using the Validation Controls, Rich Controls, The Calendar, The AdRotator, Pages with Multiple Views, User Controls and Graphics	Evaluation, PPT
3	Error Handling, Logging, and Tracing		

3.1	Understand Co2 Remember Co1	Understanding Exception Handling, Handling Exceptions, Throwing Your Own Exceptions, Using Page Tracing	Explain
3.2	Understand Co2	State Management	Explain, PPT
3.3	Remember Co1 Understand Co2 Analysing Co4	Using View State, Transferring Information Between Pages, Using Cookies, Managing Session State, Configuring Session State	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Using Application State, Comparing State Management Options	Lecture method, Explanation
3.5	Analysing Co4 Apply Co3	Styles, Themes, Master Page Basics, Advanced Master Pages,	Explanation , PPT
4	ADO.NET Fundamentals		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Understanding Databases, Configuring Your Database, Understanding SQL Basics	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access.	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Data Binding: Introducing Data Binding, Using Single-Value Data Binding,	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	Using Repeated-Value Data Binding, Working with Data 12 10 Source Controls	Lecture method, Explanation Demonstrate
4.4	Understand Co2 Evaluation Co5 Creating Co6	The Data Controls: The GridView, Formatting the GridView, selecting a GridView Row,	Lecture method, Explanation Evaluation
4.5	Understand Co2 Creating Co6	Editing with the GridView, Sorting and Paging the GridView, Using GridView Templates, The DetailsView and FormView	Lecture method, Explanation Evaluation, Creating
5	XML		
5.1	Remember Co1 Understand Co2 Analyse Co4	XML Explained, The XML Classes, XML Validation	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	XML Display and Transforms	Lecture method, Explanation Analyse
5.3	Analyse Co4	Security Fundamentals: Understanding Security Requirements, Authentication and Authorization	Analyse
5.4	Understand Co2 Analyse Co4	Forms Authentication, Windows Authentication	Lecture method, Explanation
5.5	Understand Co2 Creating Co6	ASP.NET AJAX: Understanding Ajax, Using Partial Refreshes, Using Progress	Creating

		Notification, Implementing Timed Refreshes, Working with the ASP.NET AJAX Control Toolkit.	

Course: **Enterprise Java**

Units :

1. **Understanding Java EE**
2. **Request Dispatcher**
3. **Introduction To Java Server Pages**
4. **Introduction To Enterprise Javabeans**
5. **Persistence, Object/Relational Mapping And JPA**

	Title	Unit Outcomes	Teaching Method
1	**Understanding Java EE**		
1.1	Remember Co1	Understanding Java EE: What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Glassfish server	Lecture method, rote method
1.2	Remember Co1	Java EE Architecture, Server and Containers: Types of System Architecture, Java EE Server, Java EE Containers.	Lecture method, rote method
	Apply Co3		diagrams and charts
1.3	Remember Co1	Introduction to Java Servlets: The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do?	Lecture method, rote method
	Remember Co1		Lecture method, rote method
1.4	Remember Co1 Apply Co3	Working with Servlets: Getting Started, Using Annotations Instead of Deployment Descriptor.	Lecture method, rote method diagrams and charts
1.5	Remember Co1 Understanding Co2	Working with Databases: What Is JDBC? JDBC Architecture, Accessing Database, The Servlet GUI and Database Example.	Lecture method, Explanation
2	**Request Dispatcher**		
2.1	Remember Co1 Understanding Co2	Request Dispatcher: Resquestdispatcher Interface, Methods of Requestdispatcher, Requestdispatcher Application.	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	COOKIES: Kinds of Cookies, Where Cookies Are Used? Creating Cookies Using Servlet, Dynamically Changing the Colors of A Page	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	SESSION: What Are Sessions? Lifecycle of Http Session, Session Tracking With Servlet API, A Servlet Session Example	Lecture method, rote method; Explanation Solve

2.4	Analysing Co4	Working with Files: Uploading Files, Creating an Upload File Application, Downloading Files, Creating a Download File Application.	Demonstration
2.5	Evaluation Co5	Working with Non-Blocking I/O: Creating a Non-Blocking Read Application, Creating The Web Application, Creating Java Class, Creating Servlets, Retrieving The File, Creating index.jsp	Evaluation
3	**Introduction To Java Server Pages:**		
3.1	Apply Co3	Introduction To Java Server Pages: Why use Java Server Pages? Disadvantages Of JSP, JSP v\s Servlets, Life Cycle of a JSP Page, How does a JSP function? How doesJSP execute? AboutJava Server Pages	Demonstrate
3.2	Apply Co3	Getting Started With Java Server Pages: Comments, JSP Document, JSP Elements, JSP GUI Example.	Demonstrate
3.3	Remember Co1 Understand Co2 Demonstration Co4	Action Elements: Including other Files, Forwarding JSP Page to Another Page, Passing Parameters for other Actions, Loading a Javabean.	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Java Server Pages Standard Tag Libraries: What is wrong in using JSP Scriptlet Tags? How JSTL Fixes JSP Scriptlet's Shortcomings? Disadvantages OfJSTL, Tag Libraries.	Lecture method, Explanation
3.5	Remember Co1 Understand Co2	Implicit Objects, Scope and El Expressions: Implicit Objects, Character Quoting Conventions, Unified Expression Language [Unified El], Expression Language	Lecture method, Explanation Analyse
4	**Introduction To Enterprise Javabeans:**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Introduction To Enterprise Javabeans: Enterprise Bean Architecture, Benefits of Enterprise Bean,	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Types of Enterprise Bean, Accessing Enterprise Beans, Enterprise Bean Application, Packaging Enterprise Beans:	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Working with Session Beans: When to use Session Beans? Types of Session Beans, Remote and Local Interfaces, Accessing Interfaces, Lifecycle of Enterprise Beans, Packaging Enterprise Beans, Example of	Lecture method, Explanation Demonstrate

4.3	Remember Co1 Understand Co2 Evaluation Co5	Working with Message Driven Beans: Lifecycle of a Message Driven Bean, Uses of Message Driven Beans, The Message Driven Beans Example.	Lecture method, Explanation Evaluation
4.4	Remember Co1 Understand Co2 Analyse Co4	Interceptors: Request and Interceptor, Defining An Interceptor, AroundInvoke Method, Applying Interceptor, Adding An Interceptor To An Enterprise Bean, Build and Run the Web Application.	Lecture method, Explanation Analyse
4.5	Remember Co1 Understand Co2 Analyse Co4	Java Naming and Directory Interface: What is Naming Service? What is Directory Service? What is Java Naming and Directory interface? Basic Lookup, JNDI Namespace in Java EE, Resources and JNDI, Datasource Resource Definition in Java EE.	Lecture method, Explanation Analyse
5	**Persistence, Object/Relational Mapping And JPA**		
5.1	Remember Co1 Understand Co2 Demonstration Co4	Persistence, Object/Relational Mapping And JPA: What is Persistence? Persistence in Java, Current Persistence Standards in Java, Why another Persistence Standards? Object/Relational Mapping,	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Demonstration Co4	Introduction to Java Persistence API: The Java Persistence API, JPA, ORM, Database and the Application, Architecture of JPA, How JPA Works? JPA Specifications.	Lecture method, Explanation Analyse
5.3	Remember Co1 Understand Co2 Evaluation Co5	Writing JPA Application: Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, creating a Web Application, Adding the Required Library Files, creating a Javabean Class, Creating Persistence Unit [Persistence.Xml], Creating JSPS, The JPA Application Structure, Running the JPA Application.	Lecture method, Explanation Analyse
5.4	Remember Co1 Understand Co2 Analyse Co4	Introduction to Hibernate: What is Hibernate? Why Hibernate? Hibernate, Database and The Application, Components of Hibernate, Architecture of Hibernate, How Hibernate Works?	Lecture method, Explanation Analyse

| 5.5 | Remember Co1
Understand Co2
Analyse Co4 | Writing Hibernate Application:
Application Requirement
Specifications, Software Requirements,
The Application Development
Approach, Creating Database and Tables
in Mysql, creating a Web
Application, Adding the Required Library
Files, creating a Javabean
Class, Creating Hibernate Configuration
File, Adding a Mapping Class,
Creating JSPS, Running The Hibernate
Application. | Lecture method,
Explanation
Analyse |

Course: Artificial Intelligence

Units :

1. Introduction
2. Basic Concepts of AI with examples of IOT based Machine
3. Practical code for different games and algorithms.

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1	What is Artificial Intelligence? Foundations of AI.	Lecture method, rote method
1.2	Remember Co1	history, the state of art AI today.	Lecture method, rote method, Projector
	Apply Co3	agents and environment,	diagrams and charts
1.3	Remember Co1	good behaviour, rationality	Lecture method, rote method, Projector
1.4	Remember Co1	nature of environment, known, unknown,	Lecture method, rote method, Projector
1.5	Remember Co1 Apply Co3	the structure of agents.	Lecture method, rote method, ppt
1.6	Remember Co1 Understanding Co2	Simple agent, model-based agent, role-based agent, learning agent	Lecture method, Explanation, Lab
2	**Solving Problems by Searching, Beyond Classical Search:**		
2.1	Remember Co1 Understanding Co2	Problem solving agents, examples problems,	Lecture method, Explanation, lab
2.2	Remember Co1 Understanding Co2 Apply Co3	searching for solutions, uninformed search	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	BFs,DFS, Uniform search, IDDFS.	Lecture method, rote method; Explanation Solve
2.4	Analysing Co4	informed search strategies,	Demonstration
2.5	Evaluation Co5	Hill Climbing, Research model	Evaluation
2.6	Evaluation Co5	heuristic functions, local search algorithms,	Lecture method, rote method; Explanation Solve
2.7	Analysing Co5	searching with nondeterministic action, searching with partial observations	Evaluation
2.8	Create co6	online search agents and unknown environments.	Lecture method, Explanation,ppt
3	**Adversarial Search, Logical Agents:**		

3.1	Apply Co3	Games, optimal decisions in games,	Demonstrate
3.2	Apply Co3	alpha-beta pruning, stochastic games,	Demonstrate
3.3	Remember Co1 Understand Co2 Demonstration Co4	partially observable games, state-of- the-are game programs.	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Knowledge base agents, The Wumpus world,	Lecture method, Explanation
3.5	Evaluate co6	logic, propositional logic,	Lab , ppt
3.6	Analyse co5	propositional theorem proving, effective propositional model checking,	Lecture, projector.
3.7	Analyse co5	agents based on propositional logic.	Lecture, projector.
4	**First Order Logic, Inference in First Order Logic:**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Syntax and semantics, using First Order Logic,	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Knowledge engineering in First Order Logic.	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	propositional vs. First Order,	Lecture method, Explanation Demonstrate
4.4	Remember Co1 Understand Co2 Demonstration Co4	unification and lifting, forward and backward chaining, resolution.	Lecture method, Explanation Demonstrate
5	**Planning, Knowledge Representation:**		
5.1	Remember Co1 Understand Co2 Demonstration Co4	Definition of Classical Planning, Algorithms for planning as state space search,	Lecture method, Explanation Demonstrate
5.2	Remember Co1 Understand Co2 Evaluation Co5	planning graphs, other classical planning approaches,	Lecture method, Explanation Evaluation
5.3	Remember Co1 Understand Co2 Evaluation Co5	analysis of planning approaches, Time, Schedules and resources, hierarchical planning,	Lecture method, Explanation Evaluation
5.4	Remember Co1 Understand Co2 Evaluation Co5	Planning and Acting in Nondeterministic Domains, multiagent planning,	Lecture method, Explanation Evaluation
5.5	Remember Co1 Understand Co2 Analyse Co4	Categories and Objects, events, mental events and objects,	Lecture method, Explanation Analyse

5.6	Remember Co1 Understand Co2 Analyse Co4	reasoning systems for categories, reasoning with default information, Internet shopping world	Lecture method, Explanation Analyse

Course: Security in Computing

Units:

1. Introduction
2. Basic Concepts of Security in computing with practical knowledge of CCNA.
3. Practical implementation of cisco packet tracer with different security concept.

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Remember Co1	The Importance of Information Protection	Lecture method, rote method
1.2	Remember Co1	The Evolution of Information Security, Justifying Security Investment, Security Methodology,	Lecture method, rote method, Projector
	Apply Co3	How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics,	diagrams and charts
1.3	Remember Co1	Business Processes vs. Technical Controls. Risk Analysis: Threat Definition,	Lecture method, rote method, Projector
1.4	Remember Co1	Types of Attacks, Risk Analysis. Secure Design Principles: The CIA Triad and Other Models, Defence Models, Zones of Trust,	Lecture method, rote method, Projector
1.5	Remember Co1 Apply Co3	Zones of Trust, Best Practices for Network Defence.	Lecture method, rote method, ppt
1.6	Remember Co1 Understanding Co2	Strategy and Tactics, Business Processes vs. Technical Controls.	Lecture method, Explanation, Lab
2	Authentication and Authorization, Encryption, Storage Security:		
2.1	Remember Co1 Understanding Co2	Authentication, Authorization Encryption: A Brief History of Encryption, Symmetric-Key	Lecture method, Explanation, lab
2.2	Remember Co1 Understanding Co2 Apply Co3	Cryptography, Public Key Cryptography, Public Key Infrastructure. Storage Security:	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices.	Lecture method, rote method; Explanation Solve
2.4	Analysing Co4	General Database Security Concepts, Understanding Database Security Layers,	Demonstration
2.5	Evaluation Co5	Understanding Database Level Security, Using Application Security, Database Backup and Recovery, Keeping Your Servers Up to Date,	Evaluation

2.6	Evaluation Co5	Database Auditing and Monitoring.	Lecture method, rote method; Explanation Solve
2.7	Analysing Co5	Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices	Evaluation
2.8	Create co6	Security Layers, Understanding Database Level Security, Using Application Security,	Lecture method, Explanation
3	Secure Network Design, Network Device Security:		
3.1	Apply Co3	Introduction to Secure Network Design, Performance, Availability, Security.	Demonstrate
3.2	Apply Co3	Switch and Router Basics, Network Hardening.	Demonstrate
3.3	Remember Co1 Understand Co2 Demonstration Co4	Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	Capabilities, Firewall Design. Wireless Network Security: Radio Frequency Security Basics, DataLink Layer Wireless Security Features,	Lecture method, Explanation
3.5	Evaluate co6	Flaws, and Threats, Wireless Vulnerabilities and Mitigations, Wireless Network Hardening Practices and Recommendations,	Lab , ppt
3.6	Analyse co5	Wireless Intrusion Detection and Prevention	Lecture, projector.
3.7	Analyse co5	Wireless Network Positioning and Secure Gateways.	Lecture, projector.
4	Intrusion Detection and Prevention Systems, Operating System Security Models:		
4.1	Remember Co1 Understand Co2 Demonstration Co4	IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Management (SIEM). Voice over IP (VoIP) and PBX Security:	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	Background, VoIP Components, VoIP Vulnerabilities and Countermeasures, PBX, TEM: Telecom Expense Management	Lecture method, Explanation Demonstrate
4.4	Remember Co1 Understand Co2 Demonstration Co4	Operating System Security Models: Operating System Models, Classic Security Models, Reference Monitor, T	Lecture method, Explanation Demonstrate
4.5	Remember Co1 Understand Co2 Demonstration Co4	Trustworthy Computing, International Standards for Operating System Security.	Lecture explnation

5	Virtual Machines and Cloud Computing, Secure Application Design:		
5.1	Remember Co1 Understand Co2 Demonstration Co4	Virtual Machines, Cloud Computing.	Lecture method, Explanation Demonstrate
5.2	Remember Co1 Understand Co2 Evaluation Co5	Secure Application Design: Secure Development Lifecycle, Application Security Practices,	Lecture method, Explanation Evaluation
5.3	Remember Co1 Understand Co2 Evaluation Co5	Web Application Security, Client Application Security, Remote Administration Security	Lecture method, Explanation Evaluation
5.4	Remember Co1 Understand Co2 Evaluation Co5	Remote Administration Security. Physical Security: Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security,	Lecture method, Explanation Evaluation
5.5	Remember Co1 Understand Co2 Analyse Co4	Physical Vulnerability Assessment, Choosing Site Location for Security, Securing Assets: Locks and Entry Controls, Physical Intrusion Detection.	Lecture method, Explanation Analyse

	Title	Unit Outcomes	Teaching Method
1	Introduction		
1.1	Uo1(Remember)	The Internet of Things: An Overview: The Flavour of the Internet of Things, The "Internet" of "Things", The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?	Lecture method, diagrams
1.2	UO2 (Understanding)	To understand the flow of IoT	Group Discussion
	UO3 (Apply)	To apply IoT principles on various applications	Lecture method, charts
1.3	UO4 (Analyse)	Understand various software testing methods and strategies.	Lecture method
	UO5 (Evaluate)	To understand different types of device connectivity.	Diagrams
1.4	UO6 (Create)	Module integration.	Lab Session
2			
2.1	Uo1(Remember)	Thinking About Prototyping.	Lecture method, diagrams
2.2	UO2 (Understanding)	To understand Sketching, Familiarity, Costs versus Ease of Prototyping, Prototypes and Production, Changing Embedded Platform, Physical Prototypes and Mass Personalisation, climbing into the Cloud,	Lecture method,
	UO3 (Apply)	Raspberry Pi, Cases and Extension Boards, Developing on the Raspberry Pi, Some Notes on the Hardware, Openness.	Lecture method, charts
2.3	UO4 (Analyse)	Various prototyping models	Lecture method
	UO5 (Evaluate)	Class Test,Presentation	Activities to be conducted in class room
2.4	UO6 (Create)	Starting Raspbian OS, Familiarising with Raspberry Pi Components and interface, Connecting to ethernet, Monitor, USB.	Lab Session
3			
3.1	Uo1(Remember)	Prototyping the Physical Design	Lecture method, diagrams

3.2	UO2 (Understanding)	Preparation, Sketch, Iterate, and Explore, Nondigital Methods, Laser Cutting, Choosing a Laser Cutter, Software, Hinges and Joints, 3D Printing, Types of 3D Printing, Software, CNC Milling, Repurposing/Recycling.	Lecture method,
	UO3 (Apply)	Getting Started with an API, Mashing Up APIs, Scraping, Legalities, writing a New API, Clockodillo.	Lecture method, charts
3.3	UO4 (Analyse)	To understand how testing methods can be used as an effective tools in providing quality assurance concerning for software.	Lecture method
	UO5 (Evaluate)	Practical using different application	Lab sessions
3.4	UO6 (Create)	Displaying different LED patterns with Raspberry Pi. Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi	Lab sessions
4			
	Uo1(Remember)	Techniques for Writing Embedded Code	Lecture method, diagrams
4.2	UO2 (Understanding)	Memory Management, Types of Memory, Making the Most of Your RAM, Performance and Battery Life, Libraries, Debugging.	Lecture method,
	UO3 (Apply)	Startup, Hobby Projects and Open Source, Venture Capital, Government Funding, Crowdfunding, Lean Startups.	Lecture method, charts
1.3	UO4 (Analyse)	Understanding sensor network	Lecture method
	UO5 (Evaluate)	Class Test,Presentation	
1.4	UO6 (Create)	Raspberry Pi GPS Module Interfacing	Lab Session
5			
	Uo1(Remember)	Moving to Manufacture	Lecture method, diagrams
1.2	UO2 (Understanding)	Producing? Designing Kits, Designing Printed circuit boards, Software Choices, The Design Process, Manufacturing Printed Circuit Boards, Etching Boards, Milling Boards.	Lecture method,

	UO3 (Apply)	Characterizing the Internet of Things, Privacy, Control, Disrupting Control.	Lecture method, charts
1.3	UO4 (Analyse)	Various Model designing process	Lecture method
	UO5 (Evaluate)	Group Disscussion	
1.4	UO6 (Create)	Installing Windows 10 IoT Core on Raspberry Pi	Lab Session

Course: IT services and management

Units :

1. Understand the concepts related to Business.
2. Identify Service Validation and Testing, Evaluation, Knowledge Management.
3. To help the students to develop cognizance of the importance of management principles
4. A learner will learn with challenges and procedures that occurred in the service transition process.

	Title	Unit Outcomes	Teaching Method
1	IT Service Management		
1.1	Remember Co1	To understand concept of service strategy, its principles , Challenges, Critical Success factors and risks	Lecture method, rote method
1.2	Remember Co1	To make students aware about the service design principles, service design process.	Lecture method, rote method, Projector
1.3	Remember Co1	Ability of understanding the concept of service Life Cycle, Functions and processes across the life cycle.	Lecture method, rote method, Projector
1.4	Remember Co1	To help the students to develop cognizance of the importance of management principles.	Lecture method, rote method, Projector
1.5	Remember Co1 Understanding Co2	Understand the concepts related to Business	Lecture method, Explanation, Lab
2	Service Design		
2.1	Remember Co1 Understanding Co2	identifying and documenting business requirements and drivers, Design activities, Design aspects, Subsequent design activities, Design constraints .	Lecture method, Explanation, lab
2.2	Remember Co1 Understanding Co2 Apply Co3	To enable them to analyse and understand the environment of the organization.	Lecture method, rote method; Explanation Solve
2.3	Remember Co1 Understanding Co2 Apply Co3	To help the students gain understanding of the functions and responsibilities of managers.	Lecture method, rote method; Explanation Solve
2.4	Analysing Co4	Identify Service Catalogue Management, Service Level Management.	Lecture method, rote method; Explanation Solve
2.5	Evaluation Co5	Identify Capacity Management, Availability Management, IT Service Continuity Management	Evaluation
2.6	Evaluation Co5	To provide them tools and techniques to be used in the performance of the managerial job	Lecture method, rote method; Explanation Solve
3	Service Transition:		
3.1	Apply Co3	Identify Service Validation and Testing, Evaluation, Knowledge Management.	Demonstrate

3.2	Apply Co3	Understanding concepts of Service Asses Configuration Management, Service and Deployment	Demonstrate
3.3	Remember Co1 Understand Co2 Demonstration Co4	Understanding concept of Transition planning and support, Change Management	Lecture method, Explanation Demonstrate
3.4	Remember Co1 Understand Co2	A learner will learn with challenges and procedure that occurred in service transition process.	Lecture method, Explanation
3.5	Evaluate co6	Challenges, Critical Success factors, Risks, Service Transition under difficult Conditions	Lab , ppt
4	Service Operation		
4.1	Remember Co1 Understand Co2 Demonstration Co4	To learn the concepts of Fundamentals, Service Operation Principles: Functions, groups, teams, departments and divisions, a chieving balance in service operations	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	To learn the concepts of Providing service, Operation staff involvement in service design and service transition, Operational Health, Communication, Documentation	Lecture method, Explanation Demonstrate
4.3	Remember Co1 Understand Co2 Demonstration Co4	To learn the concepts of Event Management, Incident Management, Request fulfilment, Problem Management, Access Management,	Lecture method, Explanation Demonstrate
4.4	Remember Co1 Understand Co2 Demonstration Co4	To learn the concepts of Operational activities of processes covered in other lifecycle phases.	Lecture method, Explanation Demonstrate
5	Continual Service Improvement (CSI) Principles		
5.1	Remember Co1 Understand Co2 Demonstration Co4	To gain the depth knowledge about CSI Approach, CSI and organizational change, Ownership, CSI register.	Lecture method, Explanation Demonstrate
5.2	Remember Co1 Understand Co2 Evaluation Co5	To learn the seven-step improvement process.	Lecture method, Explanation Evaluation
5.3	Remember Co1 Understand Co2 Evaluation Co5	To obtain information about CSI Methods and Techniques: Methods and techniques	Lecture method, Explanation Evaluation
5.4	Remember Co1 Understand Co2 Evaluation Co5	To understand Organising for CSI, Organisational development, Functions, roles, Customer Engagement, Responsibility model - RACI, Competence and training	Lecture method, Explanation Evaluation

Course: Business Intelligence

Units :

1. To learn the concepts and components of Business Intelligence
2. To understand and use the technologies and tools that make up BI
3. To build and design the technologies architecture that underpins BI systems.
4. Plan the implementation of a BI System.

	Title	Unit Outcomes	Teaching Method
1	Business intelligence introduction		
1.1	Remember Co1 Understanding Co2	Business intelligence: Effective and timely decisions, Data, information and knowledge	Lecture method, PPT
1.2	Remember Co1 Understanding Co2	The role of mathematical models, Business intelligence architectures, Ethics and business intelligence	Lecture method, PPT
1.3	Understanding Co2 Apply Co3	Decision support systems: Definition of system, Representation of the decision-making process	Lecture method, PPT
1.4	Remember Co1 Understanding Co2 Apply Co3	Evolution of information systems, Definition of decision support system, Development of a decision support system	Lecture method, Notes
2	Mathematical models for decision making		
2.1	Remember Co1 Understanding Co2	Structure of mathematical models, Development of a model, Classes of models	Lecture method, Explanation, PPT
2.2	Remember Co1 Understanding Co2 Apply Co3	Definition of data mining, Representation of input data , Data mining process, Analysis methodologies	Lecture method, Explanation
2.3	Understanding Co2 Apply Co3	Data validation, Data transformation, Data reduction	Lecture method, Explanation, apply
3	Classification		
3.1	Understand Co2 Remember Co1	Classification problems, Evaluation of classification models	Explain
3.2	Understand Co2	Bayesian methods, Logistic regression, Neural networks, Support vector machines	Explain, PPT
3.3	Remember Co1 Understand Co2 Analysing Co4	Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models	Lecture method, Explanation Demonstrate
4	Business intelligence applications		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Marketing models: Relational marketing, Sales force management	Lecture method, Explanation Demonstrate
	Remember Co1 Understand Co2 Demonstration Co4	Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.	Lecture method, Explanation Demonstrate
4.2	Remember Co1 Understand Co2 Demonstration Co4	Data envelopment analysis: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices	Lecture method, Explanation Demonstrate
5	Knowledge Management		

5.1	Remember Co1 Understand Co2 Analyse Co4	Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management	Lecture method, Explanation Analyse
	Artificial Intelligence and Expert Systems:		
5.3	Analyse Co4 Understand Co2	Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence	Analyse Explanation
5.4	Understand Co2 Analyse Co4	Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems	Lecture method, Explanation

Course: Principles of GIS

Units:

1. To provide students with basic understanding of concepts of Principles of geographic information system.
2. To introduce students to the key activities performed by government and non-government and private sector with specific software tools.
3. To provide an insight into the nature of activity, risk management and resource allocation, disaster management, recovery.
4. To provide understanding of basic skill of tools to analyse.
5. Viewing report and mapping result with existing software tools.

	Title	Unit Outcomes	Teaching Method
1	**Introduction to A Gentle Introduction to GIS**		
1.1	Remember Co1 Understanding Co2	Introduction to PGIS , describing and define definitions of PGIS, Phenomena, Listing fundamental needs, stating models, mapping , arranging contents. discussing and recognizing needs software tools.	Explanation, PPT, Flow charts.
1.2	Remember Co1	Defining geographic phenomena, types of geographic phenomena	Lecture method, Quote method
1.3	Understanding Co2 Apply Co3	Understanding and summarizing concepts, objects and technology.	Lecture method, Charts,
1.4	Remember Co1 Apply Co3	Demonstrating and Examining relations between objects, fields	Lecture method, rote method
1.6	Remember Co1 Understanding Co2 Apply Co3	Introduction to geographic information, organizing and managing Spatial data. Applying condition s to solve the problems.	Lecture method, Explanation
2	**Data Management and Processing Systems Hardware and Software Trends**		
2.1	Remember Co1 Understanding Co2	Introduction, GIS Software, GIS Architecture and functionality, Spatial Data Infrastructure (SDI).	Lecture method, Explanation
2.2	Remember Co1 Understanding Co2 Apply Co3	To understand Choice of Process Models, experimenting different hardware and software tools., Applying the relational database.	Lecture method, rote method; Explanation Solve
2.3	Understanding Co2 Apply Co3 Creating Co6	Understanding and formulating or rearranging spatial database functionality. Linking database with maps	Lecture method, Explanation, apply
2.4	Analysing Co4	Inspecting and Categorising trends of software	Lecture method
2.5	Apply Co3	Concept implementation in overall planning process of Schedule applied for software tools.	Evaluation
3	**Spatial Referencing and Positioning**		

3.1	Understand Co2 Remember Co1	Understanding Objectives of and Recalling coordinates, Projection tools. Relating position and networking phases in technologies.	Lecture method, Explain diagram
3.2	Understand Co2	Expressing interpolating data, clarifying data access quality. Estimating position and accuracy of data.	Explanation, Lecture method
3.3	Remember Co1 Understand Co2 Analysing Co4	Differentiating and debating the changes of phases, Comparing and contrasting Data input and data quality.	Lecture method, Explanation Example
3.4	Remember Co1 Understand Co2	Quoting outlines of objectives with worksheet and label diagrams of software specifications.	Lecture method, Explanation
3.5	Analysing Co4 Apply Co3	Examining categorising, distinguishing networking objects measurements.	Explanation
4	**Spatial Data Analysis Classification of analytical GIS Capabilities**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Introducing, Reciting and Spatial selection queries, Classification, Proximity computations, Network analysis, interpolation, terrain modelling.	Lecture method, Explanation
	Remember Co1 Understand Co2 Demonstration Co4	Recognizing Describing Measurements classification, Computation of Proximities, Estimating quantifying errors. Reviewing standards.	Lecture method, Explanation
4.2	Remember Co1 Understand Co2 Demonstration Co3	Analysing and summarising terrain modelling, Network analysis, Raster based surface analysis, Summarising data output. Estimating result.	Lecture method, Explanation
4.3	Remember Co1 Understand Co2 Demonstration Co4	Inspecting error in data, testing possibilities phases of data models.	Lecture method, Explanation
4.4	Understand Co2 Evaluation Co5 Creating Co6	Evaluating error propagation of data models. Quantifying error.	Lecture method, Explanation Evaluation
4.5	Understand Co2 Creating Co6	Constructing or organising and assembling design tools in software for society as well as organisation.	Lecture method, Explanation Evaluation, Creating
5	**Data Visualization**		
5.1	Remember Co1 Understand Co2 Analyse Co4	Stating outlines of defined objects, recalling parameters of tool objects, label and arranging new data or modified data.	Lecture method, Explanation Analyse

5.2	Remember Co1 Understand Co2 Analyse Co4	Describing and categorising visualizing process predicating outcomes of process model .	Lecture method, Explanation Analyse
5.3	Analyse Co4	Comparing contrasting and investigating new outcomes for visual process model. Testing Questionnaire.	Analyse Techniques
5.4	Understand Co2 Analyse Co4	Expressing and reviewing outcomes of process tools. discussing possibilities of outcomes of tools.	Lecture method, Explanation
5.5	Understand Co2 Creating Co6	Understanding and extending new technological tools, upgrading software tools components.	Implementation of design software tools.

Course: Software Quality Assurance

Units:

1. To examines the software development process.

2. Examines the software to ensure it meets all requirements.

3. Testing software to detect and solve any errors in source code or design.

	Title	Unit Outcomes	Teaching Method
1	**Introduction to Quality:**		
1.1	Remember Co1	Introduction to Quality: Historical Perspective of Quality, What is Quality? (Is it a fact or perception?), Definitions of Quality, Core Components of Quality, Quality View, Financial Aspect of Quality, Customers, Suppliers and Processes.	Lecture method, Projector presentation.
1.2	Remember Co1	Total Quality Management (TQM), Quality Principles of Total Quality Management, Quality Management Through Statistical Process Control, Quality Management Through Cultural Changes.	Lecture method, Projector presentation.
	Apply Co3	Understanding Continual (Continuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving Software Tools.	diagrams and charts, Solve
1.3	Remember Co1	Software Quality: Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity	Lecture method, Projector presentation.
	Remember Co1	Understanding Requirements of a Product, Organisation Culture, Quality Management System Structure.	Lecture method, Projector presentation.
1.4	Remember Co1 Apply Co3	Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of	Lecture method, Projector presentation.

		Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality.	
1.5	Remember Co1 Understanding Co2	Pillars of Quality Management System, Important Aspects of Quality Management.	Lecture method, Projector presentation.
2	**Fundamentals of testing:**		
2.1	Remember Co1 Understanding Co2	Introduction, Necessity of testing, What is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing.	Lecture method, Projector presentation.
2.2	Remember Co1 Understanding Co2 Apply Co3	Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing.	Lecture method, Projector presentation.
2.3	Remember Co1 Understanding Co2 Apply Co3	Introduction to Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing, Test Team Approach, Process Problems Faced by Testing, Cost Aspect of Testing, Establishing Testing Policy, Methods, Structured Approach to Testing, Categories of Defect.	Lecture method, rote method; Explanation
2.4	Analysing Co4	Understanding Defect, Error, or Mistake in Software, Developing Test Strategy, Developing Testing Methodologies (Test Plan), Testing Process, Attitude Towards Testing (Common People Issues), Test Methodologies/Approaches, People Challenges in Software Testing, Raising Management Awareness for Testing, Skills Required by Tester.	Lecture method, Projector presentation.
2.5	Evaluation Co5	Learning Testing throughout the software life cycle, Software development models, Test levels, Test types, the targets of testing, Maintenance	Lecture method, Projector presentation.

		testing.	
3	**Unit Testing:**		
3.1	Apply Co3	Understanding Boundary Value Testing: Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing.	Lecture method, Projector presentation.
3.2	Apply Co3	Understanding Equivalence Class Testing: Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations.	Demonstrate,Example
3.3	Remember Co1 Understand Co2 Demonstration Co4	Table–Based Testing: Decision Tables, Decision Table Techniques, Cause-and-Effect Graphing, Guidelines and Observations,	Lecture method, Projector presentation.
3.4	Remember Co1 Understand Co2	PathTesting: Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations,	Lecture method, Projector presentation
4	**Software Verification and Validation:**		
4.1	Remember Co1 Understand Co2 Demonstration Co4	Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis od Stage Phase, Entities involved in verification, Reviews in testing lifecycle.	Lecture method, Explanation
	Remember Co1 Understand Co2 Demonstration Co4	Understanding the Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities.	Lecture method, Explanation
4.2	Remember Co1 Understand Co2 Demonstration Co4	Understanding V-test Model: Introduction, V-model for software, testing during Proposal stage, Testing during requirement stage, Testing during test planning phase,	Lecture method, Explanation

4.3	Remember Co1 Understand Co2 Demonstration Co4	Testing during design phase, Testing during coding, VV Model.	Lecture method, Explanation.
4.4	Understand Co2 Evaluation Co5 Creating Co6	Understanding Critical Roles and Responsibilities.	Lecture method, Explanation Evaluation
4.5	Understand Co2 Creating Co6	Define/Use Testing, Slice-Based Testing. Program Slicing Tools.	Lecture method, Explanation Evaluation, Creating
5	**Levels of Testing:**		
5.1	Remember Co1 Understand Co2 Analyse Co4	Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, Critical Path First, Sub System Testing, System Testing, Testing Stages.	Lecture method, Explanation Analyse
5.2	Remember Co1 Understand Co2 Analyse Co4	Special Tests: Introduction, GUI testing, Compatibility Testing, Security Testing, Performance Testing.	Lecture method, Explanation Analyse
5.3	Analyse Co4	Understanding Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Parallel Testing, Execution Testing.	Analyse
5.4	Understand Co2 Analyse Co4	Operations Testing, Compliance Testing, Usability Testing, Decision Table Testing, Documentation Testing, Training testing, Rapid Testing, Control flow graph, Generating tests on the basis of Combinatorial Designs, State Graph, Risk Associated with New Technologies.	Lecture method, Explanation
5.5	Understand Co2 Creating Co6	Process maturity level of Technology, Testing Adequacy of Control in New technology usage, Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, eBusiness eCommerce Testing, Agile	Creating Test Case,Defect Reporting

		Development Testing, Data Warehousing Testing.	