

**Yogoda Satsanga Palpara Mahavidyalaya**

**Department of Computer Science**

**Session-2021-2022**

**TEACHING PLAN**

Semester	Paper	Unit/Module		Teacher	No. of lectures	To be completed by
Semester-1	C1T1 : Programming Fundamentals using C/C++	C Language	1. Introduction to C	Mrs. Sova Pal (Bera) (Associate Professor)	30	1 <sup>st</sup> Month
			2. Data Types, Variables, Constants, Operators and Basic I/O			1 <sup>st</sup> Month
			3. Expressions, Conditional Statements and Iterative Statements			2 <sup>nd</sup> month
			4. Functions and Arrays			2 <sup>nd</sup> month
			5. Derived Data Types (Structures and Unions)			3 <sup>rd</sup> month
			6. Pointers References in C			4 <sup>th</sup> month
		C ++ Language	1. Memory Allocation in C++	Mrs. Sova Pal (Bera)	30	1 <sup>st</sup> Month

				(Associate Professor)		
			2. File I/O, Preprocessor Directives			2 <sup>nd</sup> month
			3. Using Classes in C++			3 <sup>rd</sup> month
			4. Overview of Function Overloading and Operator Overloading			4 <sup>th</sup> month
			5. Inheritance, Polymorphism and Exception Handling			5 <sup>th</sup> Month
	C1 P1 : Programming Fundamentals using C/C++ Lab	C Language	1. Introduction to C	Mrs. Sova Pal (Bera) (Associate Professor)	30	1 <sup>st</sup> Month
			2. Data Types, Variables, Constants, Operators and Basic I/O			1 <sup>st</sup> Month
			3. Expressions, Conditional Statements and Iterative Statements			2 <sup>nd</sup> month
			4. Functions and Arrays			2 <sup>nd</sup> month
			5. Derived Data Types (Structures and Unions)			3 <sup>rd</sup> month

			6. Pointers References in C			4 <sup>th</sup> month
		C ++ Languag e	1. Memory Allocation in C++	Mrs. Sova Pal (Bera) (Associat e Professo r)	30	1 <sup>st</sup> Month
			2. File I/O, Preprocessor Directives			2 <sup>nd</sup> month
			3. Using Classes in C++			3 <sup>rd</sup> month
			4. Overview of Function Overloading and Operator Overloading			4 <sup>th</sup> mont h
			5. Inheritance, Polymorphism and Exception Handling			5 <sup>th</sup> Month
	C2T2 : Compute r System Architect ure	Digital Electroni cs	1. Introduction Logic gates, boolean algebra, combinational circuits, circuit simplification, flip- flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.	Mr. Arnab Chakrab orty (SACT)	30	1 <sup>st</sup> Month And 2 <sup>nd</sup> month
			2. Data Representation and Basic Computer			3 <sup>rd</sup> month And 4 <sup>th</sup>

			Arithmetic			Month
		Computer Architecture	Basic Computer Organization and Design			1 <sup>st</sup> Month
			Central Processing Unit	Mr. Suman Mondal (Assistant Professor)	30	2 <sup>nd</sup> month
			Memory Organization			3 <sup>rd</sup> month
			Input-Output Organization			4 <sup>th</sup> Month
	<b>C2P2 : Computer System Architecture</b>	<b>Digital Experiment</b>	1. Design and implement a full adder circuit using NAND gates only. 2. Design and implement a J. K. flip-flop. 3. Design and implement a 4 bit adder using flip-flop.	Mr. Arnab Chakraborty (SACT)	30	1 <sup>st</sup> Month
			4. Design and implement a 4 bit synchronous counter.			2 <sup>nd</sup> month

			5. Design and implement a 8:1 multiplexer. 6. Design and implement a D flip-flop.			
			7. Design and implement a half subtractor using NAND gates only. 8. Design and implement a 3×8 decoder. 9. Design and implement a 8 bit parity generator. 10. Design and implement a two bit digital comparator.			3 <sup>rd</sup> month And 4 <sup>th</sup> Month
		Computer Architecture	Basic Computer Organization and Design			1 <sup>st</sup> Month
			Central Processing Unit	Mr. Suman Mondal (Assistant Professor)	30	2 <sup>nd</sup> month
			Memory Organization			3 <sup>rd</sup> month

			Input-Output Organization			4 <sup>th</sup> Month
	<b>GE-I T1 : Computer Fundamentals</b>	<b>Data Representation:</b>	Number systems and character representation, binary arithmetic		50	1 <sup>st</sup> Month
		<b>Human Computer Interface</b>	Types of software, Operating system as user interface, utility programs			1 <sup>st</sup> Month
		<b>Devices</b>	Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter	Mr. Suman Mondal (Assistant Professor)		2 <sup>nd</sup> month
		<b>Memory</b>	Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks			3 <sup>rd</sup> month
		<b>Computer Organisation and Architecture</b>	C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard			4 <sup>th</sup> Month
	<b>GE-I P1: Computer Fundamentals</b>	<b>MS Word</b>	1.Prepare a <b>grocery list</b> having four columns (Serial	Mr. Suman Mondal (Assistant	50	1 <sup>st</sup> Month

	<b>ntals Lab</b>		number, the name of the product, quantity and price) for the month of April, 06. 2. Create a <b>telephone directory</b> . 3.Design a <b>time-table form</b> for your college.	t Professo r)		
			4.XYZ Publications plans to release a new book designed as per your syllabus. Design the <b>first page of the book</b>			1 <sup>st</sup> Month
			5.Wrapping of text around the image.  6.Convert text to a table, using comma as delimiter			2 <sup>nd</sup> month
		<b>MS Excel</b>	1.Enter data in Excel Sheet 2.A company XYZ Ltd. pays a monthly salary to its employees which consists of basic salary, allowances & deductions.			3 <sup>rd</sup> month

			<p>3.Create Payment Table for a fixed Principal amount, variable rate of interests and time</p> <p>4.Use an array formula to calculate Simple Interest for given principal amounts given the rate of Interest and time</p>			4 <sup>th</sup> Month
<b>Semester-II</b>	<b>C3T: Programming in Java</b>	<b>Introduction to Java</b>	<p>Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions</p>	Mr. Arnab Chakraborty (SACT)	50	1 <sup>st</sup> Month
		<b>Arrays, Strings and I/O</b>	<p>Creating &amp; Using Arrays (One Dimension and Multi-dimensional),</p>			2 <sup>nd</sup> month



			Referencing Arrays Dynamically, Java Strings, Simple I/O using System out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.			
		<b>Object-Oriented Programming Overview</b>	Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.			3 <sup>rd</sup> month
		<b>Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata</b>	Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang,			3 <sup>rd</sup> month

			io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.			
		<b>Exception Handling, Threading, Networking and Database Connectivity</b>	Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading.			4 <sup>th</sup> Month
		<b>Applets and Event Handling</b>	Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces			4 <sup>th</sup> Month
	<b>C3P: Programming in Java (Lab)</b>	<b>Introduction to Java</b>	<ol style="list-style-type: none"> <li>1. To find the sum of any number of integers entered as command line arguments</li> <li>2. To find the factorial of a given number</li> <li>3. To learn use of</li> </ol>	Mr. Arnab Chakraborty (SACT)	50	1 <sup>st</sup> Month

			<p>single dimensional array by defining the array dynamically.</p> <p>4. To learn use of lenth in case of a two dimensional array</p> <p>5. To convert a decimal to binary number</p>			
		<b>Arrays, Strings and I/O</b>	<p>6. To check if a number is prime or not, by taking the number as input from the keyboard</p> <p>7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument</p> <p>8. Write a program that show working of different functions of</p>			2 <sup>nd</sup> month

			String and String Buffer class like set Charat ( set Length (), append (), insert (), concat ()and equals ()).			
		<b>Object-Oriented Programming Overview</b>	<p>9. Write a program to create a class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer</p> <p>10. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type)</p> <p>11. Write a program to show the difference between public</p>			3 <sup>rd</sup> month

			<p>and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword</p>			
		<p><b>Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata</b></p>	<p>12. Write a program to demonstrate the concept of boxing and unboxing.</p> <p>13. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).</p> <p>14. Write a program to create a multilevel package and also</p>			<p>3<sup>rd</sup> month</p>

			<p>creates a reusable class to generate Fibonacci series, where the function to generate fibonacci series is given in a different file belonging to the same package.</p> <p>15. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages</p>			
		<p><b>Exception Handling , Threading, Networking and Database Connectivity</b></p>	<p>16. Write a program that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.</p> <p>17. Write a program</p>			<p>4<sup>th</sup> Month</p>

			<p>to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.</p> <p>18. Write a program to demonstrate priorities among multiple threads.</p>			
		<b>Applets and Event Handling</b>	<p>19. Write a program to demonstrate different mouse handling events like mouse Clicked (), mouse Entered (), mouse Exited (), mouse Pressed, mouse Released () and mouse Dragged ().</p> <p>20. Write a program to demonstrate different keyboard handling events.</p> <p>21. Write a program to generate a window without an applet window using main () function.</p>			4 <sup>th</sup> Month

	<b>C4T: Discrete Structures</b>	<b>Introduction</b>	Sets - finite and Infinite sets, uncountably Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion	Mr. Suman Mondal (Assistant Professor)	33	1 <sup>st</sup> Month
		Growth of Functions	Asymptotic Notations, Summation formulas and properties, Bounding Summations, approximation by Integrals			2 <sup>nd</sup> month
		Recurrences	Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method, Recurrence Trees, Master Theorem			3 <sup>rd</sup> month
		Graph Theory	Basic Terminology, Models and Types, multigraphs and	Mrs. Sova Pal (Bera)	15	1 <sup>st</sup> Month And



			weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees	(Associate Professor)		2 <sup>nd</sup> month
		Prepositional Logic	Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory	Mr. Suman Mondal (Assistant Professor)	12	4 <sup>th</sup> Month
	GE 2 T : Introduction to Database System	Database	Introduction to database, relational data model, DBMS architecture, data independence, DBA, database users, end users, front end tools	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> Month
		E-R Modeling	Entity types, entity set, attribute and key, relationships, relation types, E- R diagrams, database design using ER diagrams			2 <sup>nd</sup> month
		Relational Data Model	Relational model concepts, relational constraints, primary			3 <sup>rd</sup> month

			and foreign key, normalization: 1NF, 2NF, 3NF			
		Structured Query Language	SQL queries, create a database table, create relationships between database tables, modify and manage tables, queries, forms, reports, modify, filter and view data.			4 <sup>th</sup> Month
	GE2 P : Introduction to Database System (Lab)	Structured Query Language	1) Create a database having two tables with the specified fields, to computerize a library system of a Delhi University College. Library Books (Accession number, Title, Author, Department, Purchase Date, Price) Issued Books (Accession number, Borrower)	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> Month
			2) Create the following tables and answer the queries given below: Customer (Cust ID, email, Name, Phone, Referrer ID) Bicycle (Bicycle ID, Date Purchased, Color, Cust ID, Model No) Bicycle Model (Model			2 <sup>nd</sup> month

			No, Manufacturer, Style) Service (Start Date, Bicycle ID, End Date)			
			3) Create the following tables, enter at least 5 records in each table and answer the queries given below. EMPLOYEE ( Person_Name, Street, City ) WORKS ( Person_Name, Company_Name, Salary ) COMPANY ( Company_Name, City ) MANAGES ( Person_Name, Manager_Name )			3 <sup>rd</sup> month
			4) Create the following tables, enter at least 5 records in each table and answer the queries given below. Suppliers (SNo, Sname, Status, SCity) Parts (PNo, Pname, Colour, Weight, City) Project (JNo, Jname, Jcity) Shipment (Sno, Pno, Jno, Qunatity)			4 <sup>th</sup> Month
Semester-III	C5T: Data Structures	Arrays	Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked			1 <sup>st</sup> Month

			Representation)			
		Stacks	Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack	Mr. Arnab Chakraborty (SACT)	60	1 <sup>st</sup> month
		Linked Lists	Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists; Self Organizing Lists; Skip Lists			2 <sup>nd</sup> month
		Queues	Array and Linked representation of Queue, De-queue, Priority Queues			2 <sup>nd</sup> month
		Recursion	Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack			3 <sup>rd</sup> month

			Implementation)			
		Trees	Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion , Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees). Tree traversal techniques.			3 <sup>rd</sup> month
		Searching and Sorting	Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Comparison of Sorting Techniques			4 <sup>th</sup> month
		Hashing	Introduction to Hashing, Efficiency of Rehash Methods, Resolving collision by Open Addressing, Coalesced Hashing, Separate Chaining, Dynamic and Extendible Hashing.			4 <sup>th</sup> month
	C5P: Data Structures Lab	Searching and Sorting	1. Write a program to search an element from a list. Give user the option to	Mr. Arnab Chakraborty	60	1 <sup>st</sup> month

			perform Linear or Binary search. Use Template functions. 2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.	(SACT)		
		Stacks	3. Perform Stack operations using Array implementation. Use Templates.			1 <sup>st</sup> month
		Linked Lists	4. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +). 5. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list. 6. Implement Circular Linked List using templates. Include			2 <sup>nd</sup> month

			functions for insertion, deletion and search of a number, reverse the list.			
		Queues	7. Perform Queues operations using Circular Array implementation. Use Templates. 8. Create and perform different operations on Double-ended Queues using Linked List implementation.			3 <sup>rd</sup> month
		Recursion	9. WAP to calculate factorial and to compute the factors of a given no. (i) using recursion, (ii) using iteration 10. (ii) WAP to display fibonacci series (i) using recursion, (ii) using iteration 11. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion			4 <sup>th</sup> month
		Trees	12. WAP to create a Threaded Binary Tree as per in order traversal, and implement operations like			4 <sup>th</sup> month

			finding the successor / predecessor of an element, insert an element, in order traversal. 13. WAP to implement various operations on AVL Tree.			
	C6T: Operating Systems	Introduction	Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers & workstations, process control & real time systems.	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> month
		Operating System Organization	Processor and user modes, kernels, system calls and system programs.			1 <sup>st</sup> month
		Process Management	System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling			2 <sup>nd</sup> month



			algorithms; concurrent processes, critical section, semaphores, methods for interprocess communication; deadlocks.			
		Memory Manage ment	Physical and virtual address space; memory allocation strategies – fixed and variable partitions, paging, segmentation, virtual memory			3 <sup>rd</sup> month
		File and I/O Manage ment	Directory structure, file operations, file allocation methods, device management.			4 <sup>th</sup> month
		Protectio n and Security	Policy mechanism, Authentication, Internal access Authorization.			4 <sup>th</sup> month
	C6P: Operatin g Systems Lab	C/ C++ program s	1. Write a program (using fork () and/or exec () commands) where parent and child execute: a) same program, same code. b) same program, different code. c) before terminating, the parent waits for the child to finish its task. 2. Write a program to	Mr. Suman Mondal (Assistan t Professo r)	50	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>report behaviour of Linux kernel including kernel version, CPU type and model. (CPU information) 3. Write a program to report behaviour of Linux kernel including information on configured memory, amount of free and used memory (memory information).</p> <p>4. Write a program to print file details including owner access permissions, file access time, where file name is given as argument. 5. Write a program to copy files using system calls.</p> <p>6. Write program to implement FCFS scheduling algorithm.</p> <p>7. Write program to implement Round Robin scheduling algorithm.</p> <p>8. Write program to implement SJF scheduling algorithm.</p> <p>9. Write program to calculate sum of n numbers using</p>			
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			thread library. 10. Write a program to implement first-fit, best-fit and worst-fit allocation strategies			
	C7T: Computer Networks	Introduction to Computer Networks	Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month
		Data Communication Fundamentals and Techniques	Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation;- multiplexing techniques- FDM, TDM; transmission media.			1 <sup>st</sup> month
		Networks Switching Techniques and Access	Circuit switching; packets witching-connectionless datagram switching, connection-oriented virtual circuit switching; dial-up			2 <sup>nd</sup> month

		mechanisms	modems; digital subscriber line; cable TV for data transfer.			
		Data Link Layer Functions and Protocols	Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.			2 <sup>nd</sup> month
		Multiple Access Protocol and Networks	CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;			3 <sup>rd</sup> month
		Networks Layer Functions and Protocols	Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.			3 <sup>rd</sup> month
		Transport Layer Functions and Protocols	Transport services- error and flow control, Connection establishment and release – three way handshake;			4 <sup>th</sup> month
		Overview of Application layer protocol	Overview of DNS protocol; overview of WWW & HTTP protocol.			4 <sup>th</sup> month

	C7P: Computer Networks Lab		<ol style="list-style-type: none"> <li>1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.</li> <li>2. Simulate and implement stop and wait protocol for noisy channel.</li> <li>3. Simulate and implement go back n sliding window protocol.</li> <li>4. Simulate and implement selective repeat sliding window protocol.</li> <li>5. Simulate and implement distance vector routing algorithm</li> <li>6. Simulate and implement Dijkstra algorithm for shortest path routing.</li> <li>7. Experiments for capturing and analyzing data packets using Wire Shark. • Experiments on filtering packets • Experiments on inspecting packets</li> </ol>	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month
	SEC-1T: Programming in	Unit I-	Introduction to Programming: Components of a	Mr. Suman Mondal	40	1 <sup>st</sup> month

	MATLAB		computer, working with numbers, Machine code, Software hierarchy	(Assistant Professor)		
		Unit II-	Programming Environment: MATLAB Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays			1 <sup>st</sup> month
		Unit III-	Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save.			2 <sup>nd</sup> month
		Unit IV-	Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling.			2 <sup>nd</sup> month
		Unit V-	Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.			3 <sup>rd</sup> month
		Unit VI-	Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list.			4 <sup>th</sup> month
		Unit VII-	Attaching buttons to			4 <sup>th</sup>

		GUI Interface	actions, Getting Input, Setting Output.			month
	SEC1P: Software Lab Based on MatLab	Matlab Programming	<p>1. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [ 0.6, 1.2 ,0.5, 1.3 ] ; while the numbers of each product are [ 3, 2 ,1 ,5 ]. Use MATLAB to calculate the total bill.</p> <p>2. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.</p> <p>3. The —identity   matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[ 1 2; -1 0 ]</p>	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month And 2 <sup>nd</sup> month

			<p>the identity matrix <math>I = \begin{bmatrix} 1 &amp; 0 \\ 0 &amp; 1 \end{bmatrix}</math> is generated. That is <math>A * B = I</math>.</p> <p>4. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,...,VNth entries, i.e. those numbers which have indices that are square numbers.</p> <p>5. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).</p>			
			<p>6. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.</p> <p>7. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz</p>			<p>3<sup>rd</sup> month And 4<sup>th</sup> month</p>



			<p>at the end.</p> <p>8. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.</p> <p>9. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with: i. FtoC(96) ii. lookfor Fahrenheit iii. help FtoC</p> <p>10. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks</p>			
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			<p>the same length as the concatenated strings, and (iii) the reversed concatenation. For example: i. Enter string 1: Mark ii. Enter string 2: Huckvale iii. Mark Huckvale iv. ***** v. elavkcuHkraM</p>			
	GE3P: Introduction to Programming	Introduction to C and C++	History of C and C++, Overview of Procedural Programming and Object-Oriented Programming, Using main() function, Compiling and Executing Simple Programs in C++.	Mr. Suman Mondal (Assistant Professor)	30	1 <sup>st</sup> month
		Data Types, Variables, Constants, Operators and Basic I/O	Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs			2 <sup>nd</sup> month
		Expressions,	Simple Expressions in C++ (including Unary			3 <sup>rd</sup> month

		Conditional Statements and Iterative Statements	Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct)			
		Functions and Arrays	Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions  Creating and Using One Dimensional Arrays ( Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array			4 <sup>th</sup> month
		Derived Data Types	Understanding utility of structures and unions, Declaring,	Mrs. Sova Pal (Bera)	30	1 <sup>st</sup> month

		(Structur es and Unions)	initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures	(Associat e Professo r)		
		File I/O, Preproce ssor Directive s	Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions			2 <sup>nd</sup> month
		Using Classes in C++	Principles of Object- Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables & Functions, Objects as parameters, specifying the Protected and Private Access,			3 <sup>rd</sup> month
		Inheritan ce and Polymor	Introduction to Inheritance and Polymorphism			4 <sup>th</sup> month

		phism				
	GE3P: Introducti on to c/c++ Program ming Lab	c/c++ Program ming	<p>1. Write a program to find greatest of three numbers.</p> <p>2. Write a program to find gross salary of a person</p> <p>3. Write a program to find grade of a student given his marks.</p> <p>4. Write a program to find divisor or factorial of a given number.</p> <p>5. Write a program to print first ten natural numbers.</p> <p>6. Write a program to print first ten even and odd numbers.</p> <p>7. Write a program to find grade of a list of students given their marks.</p> <p>8. Create Matrix class. Write a menu-driven program to perform following Matrix operations (2-</p>	Mr. Suman Mondal (Assistan t Professo r)	30	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			D array implementation): a) Sum b) Difference c) Product d) Transpose			
Semester-IV	C&T: Design and Analysis of Algorithms	Introduction	Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm.	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month
		Algorithm Design Techniques	Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.			1 <sup>st</sup> month
		Sorting and Searching Techniques	Elementary sorting techniques, Merge Sort, Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Medians & Order Statistics, complexity analysis;			2 <sup>nd</sup> month
		Lower Bounding Techniques	Decision Trees			2 <sup>nd</sup> month
		Balanced Trees	Red-Black Trees			3 <sup>rd</sup> month
		Advanced Analysis	Amortized analysis			3 <sup>rd</sup> month

		Technique				
		Graphs	Graph Algorithms– Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees.			4 <sup>th</sup> month
		String Processing	String Matching, KMP Technique			4 <sup>th</sup> month
	C8P: Design and Analysis of Algorithms Lab		<p>1. i. Implement Insertion Sort (The program should report the number of comparisons). ii. Implement Merge Sort (The program should report the number of comparisons)</p> <p>2. Implement Heap Sort (The program should report the number of comparisons)</p> <p>3. Implement Randomized Quick sort (The program should report the number of comparisons)</p> <p>4. Implement Radix Sort</p>	Mr. Suman Mondal (Assistant Professor)		1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>5. Create a Red-Black Tree and perform following operations on it: i. Insert a node ii. Delete a node iii. Search for a number &amp; also report the color of the node containing this number.</p> <p>6. Write a program to determine the LCS of two given sequences</p> <p>7. Implement Breadth-First Search in a graph</p> <p>8. Implement Depth-First Search in a graph</p> <p>9. Write a program to determine the minimum spanning tree of a graph For the algorithms at S. No 1 to 3 test run the algorithm on 100 different inputs of sizes varying from 30 to 1000. Count the number of comparisons and draw the graph.</p>			
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			Compare it with a graph of nlogn.			
	C9T: Software Engineering	Introduction	The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).	Mr. Arnab Chakraborty (SACT)	60	1 <sup>st</sup> month
		Requirement Analysis	Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.			1 <sup>st</sup> month
		Software Project Management	Estimation in Project Planning Process, Project Scheduling.			2 <sup>nd</sup> month
		Risk Management	Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM			2 <sup>nd</sup> month

			Plan.			
		Quality Management	Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.			3 <sup>rd</sup> month
		Design Engineering	Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.			3 <sup>rd</sup> month
		Testing Strategies & Tactics	Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing Black-Box Testing, White-Box Testing and their type, Basis Path Testing.			4 <sup>th</sup> month
	C9P: Software Engineering Lab	Practical	1.Criminal Record Management: Implement a criminal record management	Mr. Arnab Chakraborty	60	1 <sup>st</sup> month And 2 <sup>nd</sup>

		<p>system for jailers, police officers and CBI officers</p> <p>2. DTC Route Information: Online information about the bus routes and their frequency and fares</p> <p>3. Car Pooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.</p> <p>4. Patient Appointment and Prescription Management System</p> <p>5. Organized Retail Shopping Management Software</p> <p>6. Online Hotel Reservation Service System</p> <p>7. Examination and</p>	(SACT)		<p>month</p> <p>And 3<sup>rd</sup> month</p> <p>And 4<sup>th</sup> month</p>
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			<p>Result computation system</p> <p>8. Automatic Internal Assessment System</p> <p>9. Parking Allocation System</p> <p>10. Wholesale Management System</p>			
	C10T: Database Management Systems	Introduction	Characteristics of database approach, data models, database system architecture and data independence	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> month
		Entity Relationship (ER) Modeling	Entity types, relationships, constraints.			1 <sup>st</sup> month
		Relational data model	Relational model concepts, relational constraints normalization, relational algebra, SQL queries			2 <sup>nd</sup> month
		Database design	Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (up to BCNF).			3 <sup>rd</sup> month

		Transaction Processing	ACID properties, concurrency control			3 <sup>rd</sup> month
		File Structure and Indexing	Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files( Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.			4 <sup>th</sup> month
	C10P: Database Management Systems Lab	SQL	Create and use the following database schema to answer the given queries EMPLOYEE Schema Field Type NULL KEY DEFAULT Eno Char(3) NO PRI NIL Ename Varchar(50) NO NIL Job_type Varchar(50) NO NIL Manager Char(3) YES FK NIL Hire_date Date NO NIL Dno Integer YES FK NIL Commission Decimal(10,2) YES NIL Salary Decimal(7,2) NO NIL  DEPARTMENT Schema	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> month

			Field Type NULL KEY DEFAULT Dno Integer NO PRI NUL Dname Varchar(50) YES NUL Location Varchar(50) YES New Delhi			
		Query List	<p>1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.</p> <p>2. Query to display unique Jobs from the Employee Table.</p> <p>3. Query to display the Employee Name concatenated by a Job separated by a comma.</p> <p>4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.</p> <p>5. Query to display the Employee Name and Salary of all the employees earning more than \$2850.</p>			2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>6. Query to display Employee Name and Department Number for the Employee No= 7900.</p> <p>7. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.</p> <p>8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.</p> <p>9. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies \$100.</p> <p>10. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees 30. Query to display the number of employees</p>			
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			<p>performing the same Job type functions.</p> <p>11. Query to display the no. of managers without listing their names.</p> <p>12. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.</p> <p>13. Query to display Name and Hire Date for all employees in the same dept. as Blake.</p> <p>14. Query to display the Employee No. and Name for all employees who earn more than the average salary.</p> <p>15. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a <u>T</u>.</p>			
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			<p>16. Query to display the names and salaries of all employees who report to King.</p> <p>17. Query to display the department no, name and job for all employees in the Sales department.</p>			
	SEC2T: HTML Programming	Unit-I	Introduction	Mr. Suman Mondal (Assistant Professor)	40	1 <sup>st</sup> month
		Unit-II: The Basics	The Head, the Body, Colors, Attributes, Lists, ordered and unordered			1 <sup>st</sup> month
		Unit-III: Links	Introduction Relative Links, Absolute Links, Link Attributes, Using the ID Attribute to Link Within a Document.			2 <sup>nd</sup> month
		Unit-IV: Images	Putting an Image on a Page Using Images as Links, Putting an Image in the Background			2 <sup>nd</sup> month
		Unit V: Tables	Creating a Table Table Headers, Captions,Spanning			3 <sup>rd</sup> month

			Multiple Columns, Styling Table			
		Unit VI: Forms	Basic Input and Attributes Other Kinds of Inputs, Styling forms with CSS, Where To Go From Here			4 <sup>th</sup> month
	SEC2P: Software Lab Based on HTML	The Basics	<p>Q.1 Create an HTML document with the following formatting options:</p> <ol style="list-style-type: none"> <li>1. Bold</li> <li>2. Italics</li> <li>3. Underline</li> <li>4. Headings (Using H1 to H6 heading styles)</li> <li>5. Font (Type, Size and Color)</li> <li>6. Background (Colored background/Image in background)</li> <li>7. Paragraph</li> <li>8. Line Break</li> <li>9. Horizontal Rule</li> <li>10. Pre tag</li> </ol>	Mr. Suman Mondal (Assistant Professor)	40	1 <sup>st</sup> month
		Lists	<p>Q.2 Create an HTML document which consists of:</p> <ol style="list-style-type: none"> <li>I. Ordered List</li> <li>II. Unordered List</li> <li>III. Nested List</li> </ol>			1 <sup>st</sup> month
		Images	Putting an Image on a Page Using Images			2 <sup>nd</sup> month

			as Links, Putting an Image in the Background			
		Tables	Creating a Table Table Headers, Captions,Spanning Multiple Columns,Styling Table			3 <sup>rd</sup> month
		Forms	Basic Input and Attributes Other Kinds of Inputs, Styling forms with CSS,Where To Go From Here			4 <sup>th</sup> month
		frame	Create HTML documents (having multiple frames) .			4 <sup>th</sup> month
	GE4T: Program ming in Python	Planning the Compute r Program:	Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.	Mr. Arnab Chakrab orty (SACT)	60	1 <sup>st</sup> month
		Techniqu es of Problem Solving:	Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.			1 <sup>st</sup> month
		Overvie	Structure of a Python			2 <sup>nd</sup>

		w of Program ming :	Program, Elements of Python			month
		Introduc tion to Python:	Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)			2 <sup>nd</sup> month
		Creating Python Program s:	Input and Output Statements, Control statements(Branchin g, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions.			3 <sup>rd</sup> month
		Strings and Lists	String as a compound data type, Length, Traversal and the for loop, String slices,			3 <sup>rd</sup> month

			String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists			
		Object Oriented Programming:	Introduction to Classes, Objects and Methods, Standard Libraries			4 <sup>th</sup> month
		Data Structures:	Arrays, list, set, stacks and queues.			4 <sup>th</sup> month
		Searching and Sorting:	Linear and Binary Search, Bubble, Selection and Insertion sorting.			5 <sup>th</sup> month
	GE4P: Programming in Python Lab	Practical	1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.  2. Using while loop, produce a table of	Mr. Arnab Chakraborty (SACT)	60	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x).</p> <p>3. Write a program that reads an integer value and prints —leap year   or —not a leap year  .</p> <p>4. Write a function that takes an integer <u>n</u> as input and calculates the value of <math>1 + 1/1! + 1/2! + 1/3! + \dots + 1/n</math>. Write a function that takes an integer input and calculates the factorial of that number.</p> <p>5. Write a function that takes a string input and checks if it's a palindrome or not.</p> <p>6. Write a list function to convert a string into a list, as in list (<u>abc</u>) gives [a, b,</p>			
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			<p>c].</p> <p>7. Write a program to generate Fibonacci series.</p> <p>8. Write a program to check whether the input number is even or odd.</p> <p>9. Write a program to compare three numbers and print the largest one.</p> <p>10. Write a program to print factors of a given number.</p> <p>11. Write a method to calculate GCD of two numbers.</p> <p>12. Write a program to create Stack Class and implement all its methods. (Use Lists).</p> <p>13. Write a program to create Queue Class and implement all its methods. (Use Lists)</p> <p>14. Write a program to implement linear</p>			
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			and binary search on lists.  15. Write a program to sort a list using insertion sort and bubble sort and selection sort.			
Semester-V	C11T: Advanced Java	Java	Use of Objects, Array and Array List class	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month
		JavaScript	Data types, operators, functions, control structures, events and event handling.			1 <sup>st</sup> month
		JDBC	JDBC Fundamentals, Establishing Connectivity and working with connection interface, working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.			2 <sup>nd</sup> month
		JSP	Introduction to Java Server Pages, HTTP and Servlet Basics, The Problem with Servlets, The			3 <sup>rd</sup> month



			Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.			
		Java Beans	Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB.			4 <sup>th</sup> month
	C11P: Advanced Java (Lab)	Practical	<ol style="list-style-type: none"> <li>1. HTML to Servlet Applications</li> <li>2. Applet to Servlet Communication</li> <li>3. Designing online applications with JSP</li> <li>4. Creating JSP program using</li> </ol>	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>JavaBeans</p> <p>5. Working with Enterprise JavaBeans</p> <p>6. Performing Java Database Connectivity.</p> <p>7. Creating Web services with RMI.</p> <p>8. Creating and Sending Email with Java</p> <p>9. Building web applications</p>			
	C12T: Theory of Computation	Languages	Alphabets, string, language, Basic Operations on language, Concatenation, KleeneStar	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> month
		Finite Automata and Regular Languages	Regular Expressions, Transition Graphs, Deterministics and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages			2 <sup>nd</sup> month

		Context free languages	Context free grammars, parse trees, ambiguities in grammars and languages, Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.			3 <sup>rd</sup> month
		Turing Machines and Models of Computations	RAM, Turing Machine as a model of computation, Universal Turing Machine, Language acceptability, decidability, halting problem, Recursively enumerable and recursive language unsolvability problems.			4 <sup>th</sup> month
	DSE-1T: Microprocessor - 8085	Microprocessor architecture:	Internal architecture, system bus architecture, memory and I/O interfaces.	Mr. Arnab Chakraborty (SACT)	40	1 <sup>st</sup> month
		Microprocessor programming:	Register Organization, instruction formats, assembly language programming.			2 <sup>nd</sup> month and 3 <sup>rd</sup> month

		Interfacing:	Memory address decoding, I/O interface, keyboard, display, timer, interrupt controller, DMA controller, video controllers, communication interfaces.			4 <sup>th</sup> month
	DSE1P: Microprocessor (Lab)	Assembly Language Programming	<p>1. Write a program for 32-bit binary division and multiplication</p> <p>2. Write a program for 32-bit BCD addition and subtraction</p> <p>3. Write a program for linear search and binary search.</p> <p>4. Write a program to add and subtract two arrays</p> <p>5. Write a program for binary to ascii conversion</p> <p>6. Write a program for ascii to binary conversion</p> <p>7. To write an ALP program to display</p>	Mr. Arnab Chakraborty (SACT)	40	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>the keyboard status using 8086.</p> <p>8. To write an ALP program for displaying the Digital clock.</p> <p>9. To write and implement the program for stepper motor using 8085</p> <p>10. To write a program to Print RAM size and system date using 8086.</p> <p>11. To write an ALP program for password checking using 8086.</p> <p>12. To write a Program using 8086 for Copying 12 Bytes of Data from Source to Destination &amp; Verify.</p> <p>13. To search the character in a string using 8086</p> <p>14. To sort the given number in ascending order using 8086.</p>			
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			<p>15. To convert a given binary to BCD.</p> <p>16. To write an assembly language program to convert an 8 bit binary data to BCD using 8085 microprocessor kit</p>			
	DSE2T: Machine Learning	Introduction:	<p>Concept of Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning, Statistical Learning: Bayesian Method, The Naive Bayes Classifier.</p>	Mr. Arnab Chakraborty (SACT)	60	1 <sup>st</sup> month
		Software for Machine Learning and Linear Algebra Overview:	<p>Plotting of Data, Vectorization, Matrices and Vectors: Addition, Multiplication, Transpose and Inverse using available tool such as MATLAB.</p>			1 <sup>st</sup> month
		Linear Regression:	<p>Prediction using Linear Regression, Gradient Descent, Linear Regression with one variable, Linear Regression</p>			2 <sup>nd</sup> month

			with multiple variables, Polynomial Regression, Feature Scaling/Selection.			
		Logistic Regression:	Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one variable and with multiple variables.			2 <sup>nd</sup> month
		Regularization:	Regularization and its utility: The problem of Over fitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance.			3 <sup>rd</sup> month
		Neural Networks:	Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptrons, Multiclass Representation, Backpropagation Algorithm.			4 <sup>th</sup> month
	DSE2P: Machine Learning (Lab)	MABLAB /Octave	1. Perform elementary mathematical operations in Octave/MATLAB like	Mr. Suman Mondal (Assistant	60	1 <sup>st</sup> month And 2 <sup>nd</sup> month

			<p>addition, multiplication, division and exponentiation.</p> <p>2. Perform elementary logical operations in Octave/MATLAB (like OR, AND, Checking for Equality, NOT, XOR).</p> <p>3. Create, initialize and display simple variables and simple strings and use simple formatting for variable.</p> <p>4. Create/Define single dimension / multi-dimension arrays, and arrays with specific values like array of all ones, all zeros, array with random values within a range, or a diagonal matrix.</p> <p>5. Use command to compute the size of a matrix, size/length of a particular row/column, load data from a text file,</p>	Professo r)		<p>And 3<sup>rd</sup> month And 4<sup>th</sup> month</p>
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			<p>store matrix data to a text file, finding out variables and their features in the current scope.</p> <p>6. Perform basic operations on matrices (like addition, subtraction, multiplication) and display specific rows or columns of the matrix.</p> <p>7. Perform other matrix operations like converting matrix data to absolute values, taking the negative of matrix values, adding/removing rows/columns from a matrix, finding the maximum or minimum values in a matrix or in a row/column, and finding the sum of some/all elements in a matrix.</p> <p>8. Create various type of plots/charts like histograms, plot based on sine/cosine</p>			
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			<p>function based on data from a matrix. Further label different axes in a plot and data in a plot.</p> <p>9. Generate different subplots from a given plot and color plot data.</p> <p>10. Use conditional statements and different type of loops based on simple example/s.</p> <p>11. Perform vectorized implementation of simple matrix operation like finding the transpose of a matrix, adding, subtracting or multiplying two matrices.</p> <p>12. Implement Linear Regression problem. For example, based on a dataset comprising of existing set of prices and area/size of the houses, predict the</p>			
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			<p>estimated price of a given house.</p> <p>13. Based on multiple features/variables perform Linear Regression. For example, based on a number of additional features like number of bedrooms, servant room, number of balconies, number of houses of years a house has been built – predict the price of a house.</p> <p>14. Implement a classification/ logistic regression problem. For example based on different features of student’s data, classify, whether a student is suitable for a particular activity. Based on the available dataset, a student can also implement another classification problem like checking whether an email is spam or not.</p> <p>15. Use some</p>			
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			<p>function for regularization of dataset based on problem 14.</p> <p>16. Use some function for neural networks, like Stochastic Gradient Descent or back propagation - algorithm to predict the value of a variable based on the dataset of problem 14.</p>			
Semester-VI	C13T : Artificial Intelligence	Unit-1. Introduction	Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.	Mr. Suman Mondal (Assistant Professor)	60	1 <sup>st</sup> month
		Unit-2. Problem Solving and Searching Techniques	Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A*			1 <sup>st</sup> month

			algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.			
		Unit-3. Knowledge Representation	Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)			2 <sup>nd</sup> month
		Unit-4. Dealing with Uncertainty and Inconsistencies	Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.			3 <sup>rd</sup> month
		Unit-5. Understanding Natural Languages	Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.			4 <sup>th</sup> month
	C13P:	prolog	1. Write a prolog	Mr.	60	1 <sup>st</sup>

	Artificial Intelligence Lab	program	<p>program to calculate the sum of two numbers.</p> <p>2. Write a prolog program to find the maximum of two numbers.</p> <p>3. Write a prolog program to calculate the factorial of a given number.</p> <p>4. Write a prolog program to calculate the nth Fibonacci number.</p> <p>5. Write a prolog program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.</p> <p>6. Write a Prolog program to remove the Nth item from a list.</p> <p>7. Write a Prolog program, remove_nth(Before, After)</p>	Suman Mondal (Assistant Professor)	<p>month</p> <p>And 2<sup>nd</sup> month</p> <p>And 3<sup>rd</sup> month</p> <p>And 4<sup>th</sup> month</p>
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			<p>that asserts the After list is the Before list with the removal of every n<sup>th</sup> item from every list at all levels</p> <p>8. Write a Prolog program to implement append for two lists.</p> <p>9. Write a Prolog program to implement palindrome(List).</p> <p>10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.</p> <p>11. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.</p> <p>12. Write a Prolog program to implement sumlist(List,Sum) so</p>			
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			<p>that Sum is the sum of a given list of numbers List.</p> <p>13. Write a Prolog program to implement two predicates <code>evenlength(List)</code> and <code>oddlength(List)</code> so that they are true if their argument is a list of even or odd length respectively.</p> <p>14. Write a Prolog program to implement <code>reverse(List,Reversed List)</code> that reverses lists.</p> <p>15. Write a Prolog program to implement <code>maxlist(List,Max)</code> so that Max is the greatest number in the list of numbers List using cut predicate.</p> <p>16. Write a Prolog program to implement GCD of two numbers.</p>			
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			17. Write a prolog program that implements Semantic Networks/Frame Structures			
	C14T: Computer Graphics	Unit-1. Introduction	Basic elements of Computer graphics, Applications of Computer Graphics.	Mr. Arnab Chakraborty (SACT)	60	1 <sup>st</sup> month
		Unit-2. Graphics Hardware	Architecture of Raster and Random scan display devices, input/output devices.			1 <sup>st</sup> month
		Unit-3. Fundamental Techniques in Graphics	Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.			2 <sup>nd</sup> month
		Unit-4. Geometric Modeling	Representing curves & Surfaces.			2 <sup>nd</sup> month
		Unit-5. Visible Surface determination	Hidden surface elimination.			3 <sup>rd</sup> month

		ation				
		Unit-6.Surface rendering	Illumination and shading models. Basic color models and Computer Animation.			4 <sup>th</sup> month
	C14P: Computer Graphics Lab	List of Practical:	<p>1. Write a program to implement Bresenham's line drawing algorithm.</p> <p>2. Write a program to implement mid-point circle drawing algorithm.</p> <p>3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.</p> <p>4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.</p> <p>5. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).</p> <p>6. Write a program to apply various 3D</p>	Mr. Arnab Chakraborty (SACT)	40	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>transformations on a 3D object and then apply parallel and perspective projection on it.</p> <p>7. Write a program to draw Hermite/Bezier curve.</p>			
	DSE3T: Numerical Methods	Introduction	<p>Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, efficient computations</p> <p>Bisection method, Secant method, Regula-Falsi method Newton- Raphson method, Newton's method for solving nonlinear systems Gauss elimination method (with row pivoting) and Gauss-Jordan method, Gauss Thomas method for</p>	Mrs. Sova Pal (Bera) (Associate Professor)	60	1 <sup>st</sup> month

			tridiagonal systems Iterative methods: Jacobi and Gauss-Seidel Iterative methods Interpolation: Lagrange's form and Newton's form Finite difference operators, Gregory Newton forward and backward differences Interpolation			
		Piecewise polynomial interpolation:	Linear interpolation, Cubic spline interpolation (only method)			2 <sup>nd</sup> month
		Numerical differentiation	First derivatives and second order derivatives, Richardson extrapolation			3 <sup>rd</sup> month
		Numerical integration:	Trapezoid rule, Simpson's rule (only method), Newton-Cotes open formulas			3 <sup>rd</sup> month
		Extrapolation methods:	Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler's method			4 <sup>th</sup> month
		Modified Euler's methods	Heun method and Mid-point method, Runge-Kutta second			4 <sup>th</sup> month

		:	methods: Heun method without iteration, Mid-point method and Ralston's method Classical 4th order RungeKutta method, Finite difference method for linear ODE.			
	DSE3P: Numerical Methods Lab	List of Practical:	<ol style="list-style-type: none"> <li>1. Find the roots of the equation by bisection method.</li> <li>2. Find the roots of the equation by secant/ Regula -Falsi method.</li> <li>3. Find the roots of the equation by Newton's method.</li> <li>4. Find the solution of a system of nonlinear equation using Newton's method.</li> <li>5. Find the solution of tridiagonal system using Gauss Thomas method.</li> <li>6. Find the solution of system of equations using</li> </ol>	Mrs. Sova Pal (Bera) (Associate Professor)	40	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

			<p>Jacobi/Gauss-Seidel method.</p> <p>7. Find the cubic spline interpolating function.</p> <p>8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.</p> <p>9. Solve the boundary value problem using finite difference method.</p>			
	DSE-4: Dissertation / Project work		The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.	Mrs. Sova Pal (Bera) (Associate Professor), Mr. Suman Mondal (Assistant Professor), Mr.	60	1 <sup>st</sup> month And 2 <sup>nd</sup> month And 3 <sup>rd</sup> month And 4 <sup>th</sup> month

				Arnab Chakrab orty (SACT)		