Maharashtra Institute of Technology, Aurangabad
(An Autonomous Institute)

MIT
Quest for Excellence

MAHARASHTRA INSTITUTE OF TECHNOLOGY, AURANGABAD

**An Autonomous Institute Affiliated to
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad, Maharashtra (India)**

Second Year B. Tech. Syllabus (Artificial Intelligence and Data Science) 2022-23

Maharashtra Institute of Technology, Aurangabad
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Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hr /Wk	Credits	MSE-I	MSE-II	CIE	TA	ESE/ Oral	Total
S. Y. B. Tech. Syllabus Structure w.e.f. 2022-23														
Artificial Intelligence and Data Science														
Orientation Programs (2 Days)														
1.1	BSC	BSC204	Linear Algebra & Transform	3	1	-	4	4	15	15	10	10	50	100
1.2	PCC	AID201	Core Course-I Data Structure and Algorithms	3	-	-	3	3	15	15	10	10	50	100
1.3	PCC	AID202	Core Course-II Introduction to Artificial Intelligence	3	-	-	3	3	15	15	10	10	50	100
1.4	PCC	AID203	Core Course-III Object Oriented Programming	3	-	-	3	3	15	15	10	10	50	100
1.5	PCC	AID204	Core Course-IV Microprocessors and Microcontrollers	3	-	-	3	3	15	15	10	10	50	100
1.6	PCC	AID221	Lab-I: Data Structure and Algorithms	-	-	2	2	1	-	-	-	-	25	25
1.7	PCC	AID222	Lab-II: Introduction to Artificial Intelligence	-	-	2	2	1	-	-	-	25	-	25
1.8	PCC	AID223	Lab-III: Object Oriented Programming	-	-	2	2	1	-	-	-	25	25	50
1.9	PCC	AID224	Lab-IV: Microprocessors and Microcontrollers	-	-	2	2	1	-	-	-	-	25	25
1.10	PCC	AID225	Lab-V: Data Analytics Lab	-	-	2	2	1	-	-	-	25	-	25
1.11	HSMC	HSM 804	Mandatory Non-Credit Course	2	-	-	2	-	Mandatory Non-Credit Course					
S3				17	1	10	28	21	75	75	50	125	325	650
Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hr /Wk	Credits	MSE-I	MSE-II	CIE	TA	ESE/ Oral	Total
2.1	BSC	BSC251A	Complex Variable & Vector Calculus	3	1	-	4	4	15	15	10	10	50	100
2.2	PCC	AID251	Core Course-I Database Management System	3	-	-	3	3	15	15	10	10	50	100
2.3	PCC	AID252	Core Course-II Data Communication and Networking	3	-	-	3	3	15	15	10	10	50	100
2.4	PCC	AID253	Core Course-III Discrete Mathematics and Graph Theory	3	-	-	3	3	15	15	10	10	50	100
2.5	PCC	AID281 - AID283	Professional Elective-I	3	-	-	3	3	15	15	10	10	50	100
2.6	PCC	AID271	Lab-I: Database Management System	-	-	2	2	1	-	-		-	25	25
2.7	PCC	AID272	Lab-II: Data Communication and Networking	-	-	2	2	1	-	-		25	-	25
2.8	PCC	AID273	Lab-III: Web Programming	-	-	2	2	1	-	-		-	25	25
2.9	HSMC	HSM254	Lab-IV: Development of Skills (Soft Skills)	-	-	2	2	1	-	-		25	25	50
2.10	PCC	AID274	Lab-V: Problem-based learning	-	-	2	2	1	-	-		25	-	25
2.11	HSMC	HSM 805- HSM 807	Mandatory Non-Credit Course	2	-	-	2	-	Non-Credit Mandatory Course					
S4				17	1	10	28	21	75	75	50	125	325	650

L-Lecture, T- Tutorial, P- Practical, MSE- Mid Semester Exam, CIE- Continuous In-semester Evaluation, TA-Teacher Assessment, ESE- End Semester Examination

Semster-3	**Mandatory Non-Credit Course**
HSM 804	Constitution of India

Semester-4	**Professional Elective-I**
AID281	Computer Graphics
AID282	Embedded System
AID283	Human Computer Interaction

Semester-4	**Mandatory Non-Credit Course**
HSM 805	Professional Ethics and Corporate Social Responsibility
HSM 806	Emotional Intelligence
HSM 807	Stress Management Through Yoga

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(Faculty of Science & Technology) **Syllabus of S. Y. B. Tech. (All branches)**	
Course Code: BSC204	Credits: 3-1-0
Course: Linear Algebra & Transform	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs/week	Continuous In-semester Evaluation: 10 Marks
Tutorial: 01 Hr/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs

Prerequisite	Basic formulae of trigonometry, Derivative, Integration, Basic knowledge of Determinant and Matrices.
Course Objectives	1. To know the application of the matrix technique in finding find solution of system of linear equations that arises in many engineering problems. 2. To understand and solve higher order differential equations and apply them by mathematical modelling in various engineering problems. 3. To study and apply concept of transform.
Unit-I	**Complex Number** Introduction to complex number, De-Moivrer's theorem, root of complex number, circular function & hyperbolic function, relation between circular & hyperbolic function, inverse hyperbolic functions, separation of real & imaginary parts, Logarithm of complex quantity. (07 Hrs)
Unit-II	**Matrix** Introduction to matrix, rank of matrix-echelon form, normal form, solution of simultaneous linear equations (homogeneous & non homogeneous). Eigen values and Eigen vectors, Cayley-Hamilton theorem. (06 Hrs)
Unit-III	**Probability Distribution** Introduction, Probability distribution: Binomial distribution, Poisson distribution, Normal distribution. (05 Hrs)

Unit-IV	**Linear Differential Equation & Its Applications** Solution of nth order linear differential equation with constant coefficients: Complementary function, Particular integral- short method, method of variation of parameters, Application of Linear differential equation to electrical circuit, Civil and mechanical. (06 Hrs)	
Unit-V	**Laplace Transform** Definition, Laplace Transforms of elementary functions, Theorems and properties of Laplace transform (without proof): First shifting and second shifting theorem, Change of scale, Multiplication by t , Division by t, Laplace transform of Derivatives, Laplace transform of integral, Evaluation of integrals using Laplace transform, Laplace transform of Unit step function and Dirac's delta function. (06 Hrs)	
Unit-VI	**Inverse Laplace transform** Definition, Inverse Laplace transforms using: a) Some elementary functions b) Theorem and properties of Laplace transform c) Partial fraction method d) Convolution theorem. Application of Laplace transform to solve linear differential equations with given initial conditions. (06 Hrs)	

	Sr. No.	Title	Author	Publication	Edition
References	1.	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10th edition
	2.	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	1st edition
	3.	Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th Edition
	4.	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publications	43th edition
	5.	Applied Mathematics	P. N. Wartika& J. N. Wartikar	Pune Vidyarthi Griha Pub	9th edition
	6.	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Laxmi Publication
	7.	Advanced Engineering Mathematics.	H.K.Dass	S.Chand And Co.Ltd	18th edition

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Syllabus of S. Y. B. Tech. (AIDS) Semester III

Course Code: AID201	Credits: 3-0-0
Course: Data Structures and Algorithms	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs

Prerequisite	Programming language, Mathematics and Statistics, Good Logical Thinking
Objectives	1. To introduce data abstraction and data representation in memory 2. To describe, design and use of elementary data structures such as stack, queue, linked list, tree and graph 3. To discuss decomposition of complex programming problems into manageable sub problems 4. To introduce algorithms and their complexity.
Unit-I	**Introduction to Data Structures & Algorithms** Data types, Data structure and Abstract date type, Dynamic memory allocation in C, Introduction to Algorithms, Asymptotic notations and common functions (06 Hrs)
Unit-II	**Stack** Basic Concept of Stack, Stack as an ADT, Stack Operations, Stack Applications Conversion from infix to postfix/prefix expression, Evaluation of postfix/ prefix expressions, Recursion **Queue** Basic Concept of Queue, Queue as an ADT, Primitive Operations in Queue, Linear Queue, Circular Queue, Queue Applications (06 Hrs)
Unit-III	**Lists** Basic Concept, List and ADT, Array Implementation of Lists, Linked List, Types of Linked List: Singly Linked List, Doubly Linked List, Circular Linked List. Basic operations in Linked List: Node Creation, Node Insertion and Deletion from Beginning, End and Specified Position, Stack and Queue as Linked List (06 Hrs)

Unit-IV	**Trees and Graphs** Concept and Definitions, Basic Operations in Binary Tree, Tree Height, Level and Depth, Binary Search Tree, Insertion, Deletion, Traversals techniques, Search in BST, Applications of Trees, Graph: Definition and Representation of Graphs, Graph Traversal techniques. (06 Hrs)			
Unit-V	**Sorting** Introduction and Types of sorting: Internal and External sort, Comparison Sorting Algorithms: Bubble, Selection and Insertion Sort, Shell Sort, Efficiency of Sorting Algorithms **Searching and Hashing** Introduction to Searching, Search Algorithms: Sequential Search, Binary Search Efficiency of Search Algorithms Hashing: Hash Function and Hash Tables, Collision Resolution Techniques. (06 Hrs)			
Unit-VI	**Algorithmic Techniques** Divide-n- Conquer: General Strategy, Merge and Quick Sort, Greedy Approach: General Strategy, Minimum Cost Spanning Trees: Kruskal and Prims Algorithm (06 Hrs)			

	Sr. No.	Title	Author	Publication	Edition
References	1	Data Structures using C and C++	Y Langsam , MJ Augenstein and A.M , Tanenbaum	Prentice Hall India	Second Edition 2015
	2	Programmes and Data Structures in C	Leen Ammeral	Wiley Professional Computing	Second Edition
	3	Introduction to Data Structure and Algorithms with C and C++	G.W Rowe	Prentice-Hall India	Second Edition
	4	Data Structure and Program Design in C	R.L Kruse, B.P. Leung, C.L. Tondo,	Prentice-Hall India	Second Edition
	5	Fundamentals of Computer Algorithms	Ellis Horowitz, Sartaj Sahani,S. Rahsekaran	Universities Press	Second Edition

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Syllabus of S. Y. B. Tech. (AIDS) Semester III	
Course Code: AID202	Credits: 3-0-0
Course: Introduction to AI	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs
Prerequisite	Basics of Algorithms
Objectives	1. After completion of the course, students will have adequate knowledge of background and basic concepts of Artificial Intelligence. 2. To have understanding of different applications of Artificial Intelligence 3. Able to Apply Artificial Intelligence techniques for problem solving.
Unit-I	**Introduction** What is Artificial Intelligence? Intelligent Agents, Agents and Environments: structure of agents, Turing test, Types of environments, Types of agents, the concept of rationality, problem solving agent problem formulation. (06 Hrs)
Unit-II	**State Space and Heuristic Search** Generate and tests, simple search, Depth first search (DFS), Breadth First Search (BFS), Comparison, Quality of Solution, Depth Bounded DFS, Depth First Iterative Deepening, Heuristic Functions, Search Techniques: Hill climbing, Local Maxima, Solution Space Search. (06 Hrs)
Unit-III	**Optimal Path Finding** Brute Force, Branch & Bound, Dijkstra Algorithm, A*, Admissible A*, Iterative Deepening A*, Beam Search, Tabu Search, Peak to peak method. (06 Hrs)
Unit-IV	**Game Playing** mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions (06 Hrs)
Unit-V	**Constraint Satisfaction**

	N Queens, Constraint Propagation, Scene labeling, Higher order consistency, Algorithm backtracking, Look-head strategies, Strategic retreat. (06 Hrs)				
Unit-VI	**Applications of Artificial intelligence** Learning from observation Inductive learning, machine learning, Types of Learning. (06 Hrs)				
References	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1	Artificial Intelligence – A Modern Approach	stuart J. Russell, Peter Norvig	Pearson	3rd
	2	Artificial Intelligence: Concepts and Applications	Lavika Goel	Wiley publications	3rd
	3	Artificial Intelligence	Kevin Knight, Elaine Rich,	McGraw Hill	3rd

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Syllabus of S. Y. B. Tech. (AIDS) Semester III	
Course Code: AID203	Credits: 3-0-0
Course: Object Oriented Programming	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs
Prerequisite	Basics of Programming Languages.
Objectives	1. To understand Object Oriented Programming concepts 2. To understand the characteristics of Java, principles of packages, inheritance and interfaces. 3. To define exceptions and use I/O streams 4. To design and build simple Graphical User Interfaces
Unit-I	**Introduction to OOP and JAVA** Need of Object-Oriented Programming (OOP), Procedure Oriented Programming (POP) Versus Object Oriented Programming (OOP),Features of Object Oriented Paradigm, History of Java, Features of Java, Difference between Java, C and C++, Java Development Kit (JDK) (06 Hrs)
Unit-II	**Java Programming Basics** Introduction to Java, Simple java program, Keywords& Identifiers, Data types, Variables, Operators, Input and Output in Java, Control structures including selection, Looping, Java methods, Math class, Strings and Arrays in java, Structure of Java Program (06 Hrs)
Unit-III	**Classes and Objects** Defining Class, Field declaration, Method Declaration, Creating Objects, Accessing class Members, Constructors, Static Members, Access modifiers, this reference. (06 Hrs)
Unit-IV	**Inheritance, Interfaces and Packages** Inheritance in java, Super and sub class, Defining subclass, Multilevel and

	hierarchical Inheritance, Overriding methods, final keyword, abstract class and methods, visibility controls. Interface in java, defining Interfaces, extending and implementing interfaces.	
	Packages: Defining packages, Class path variable, creation of package, importing packages (06 Hrs)	
Unit-V	**Exception Handling and File Processing**	
	Exception Handling: types of errors, Definition of an Exception; Exception handling basics, multiple catch statements, using finally, throwing exceptions. Input / Output files in Java: Streams Basics, stream classes, byte stream classes, character stream classes, using file class, creating files, Readers and Writers, Random Access Files. (06 Hrs)	
Unit-VI	**Multithreading Programming and Applets**	
	Introduction to multithreading, Thread Class, creating thread, stopping and blocking thread, life cycle of thread, using thread methods. What are Applets? applets and applications, creating applet, life Cycle of an Applet, designing webpage, applet tag, adding applet to html page, running an applet (06 Hrs)	

	Sr. No.	Title	Author	Publication	Edition
References	1.	Java: The Complete Reference	Herbert Schildt	McGraw Hill	11th Edition
	2.	Programming with Java	E Balagurusamy	McGraw Hill	6th Edition
	3.	Programming in Java	Sachin Malhotra Saurabh Chaudhary	Oxford University Press	2nd Edition
	4.	Java 8 Programming: Black Book	Steven Holzner	Dreamtech Press	2nd Edition
	5.	Java : How to Program	H.M.Deitel,P.J. Deitel	Pearson Publication	10th Edition

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Syllabus of S. Y. B. Tech. (AIDS) Semester III	
Course Code: AID204	Credits: 3-0-0
Course: Microprocessor & Micro-controller	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs
Prerequisite	Basic Electronics, Computer Organization and Architecture
Objectives	1. To introduce fundamental concepts of digital electronics, logic gates, number systems and design of Combinational and Sequential Circuits 2. To understand 8086 microprocessor architecture, functionality & assembly language programming. 3. To understand the 8051 micro-controller architecture and programming
Unit-I	**Fundamental of Digital Systems** Digital Signal, Digital circuit, Basic & Universal logic gates, EX-OR & EX-NOR operations, Boolean algebra, Simplification of Boolean expressions. Number Systems Introduction to number systems, Binary, octal decimal, hexadecimal, binary arithmetic, Number system conversion, one's & two's complement arithmetic. (06 Hrs)
Unit-II	**Combinational & Sequential Circuit** Sum of product (SOP) form, Product of sum (POS) form, Representation of logical function, Simplification of logical functions, Minimization using K- Map (Upto 4 variables). Half Adder, Full Adder, Half Sub-tractor, Full sub-tractor, Multiplexers (MUX), De-multiplexers (DEMUX). Introduction to Sequential Circuits: Basic Latch, flip-flop & its type. (06 Hrs)
Unit-III	**Microprocessor** Introduction to Microprocessor, 8086 Architecture & Pin descriptions, features of 8086 microprocessor, Register organization of 8086 microprocessor, Physical

	memory organization.			(06 Hrs)

Unit-IV	**Assembly language Programming with 8086** Machine language Instruction Formats, addressing modes of 8086, Instruction Set: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction. Assembler Directives and operators, Assembly language programs. (06 Hrs)
Unit-V	**Micro-controller** Introduction to Micro-controller, Comparison of Microprocessor and Micro-controller, Micro-controller 8051 Architecture, Features of 8051. (06 Hrs)
Unit-VI	**Interfacing of 8051** 8051 programming – addressing modes and instruction sets, Interfacing of LED with 8051, Interfacing of Switch, Interfacing of LM35 temperature sensor, interfacing of relay, interfacing of DC motor. (06 Hrs)

	Sr. No.	Title	Author	Publication	Edition
References	1	Modern Digital Electronics	R.P. Jain	Tata McGraw Hill	2nd Edition
	2	Fundamentals of Digital Circuits	A. Kumar	Prentice Hall India	2nd Edition
	3	Advanced Microprocessors & Peripherals	A.K. Ray & K. M. Bhurchandi	Tata McGraw Hill	2nd Edition
	4	The 8051 Micro-controller and Embedded	Muhammas Mazidi, Janice Mazidi and RolinMcKinlay	Prentice Hall India	2nd Edition
	5	Microprocessor and Micro-controllers	Krishna Kant	Prentice Hall India	2nd Edition

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Syllabus of S. Y. B. Tech. (AIDS) Semester III

Course Code: AID221	Credits: 0-0-1
	End Semester Examination / Oral: 25 Marks
Course: Lab-I Data Structures and Algorithms Teaching Scheme: Practical: 02 Hrs/week	

Objectives	:	To acquire practical knowledge of data structures and Algorithms
List of Practical	:	The laboratory work includes. 1 Write a program with dynamic memory allocation and de-allocation. 2 Write a program to implement stack operations. 3 Write a program using stack to convert infix expression to postfix/prefix expression and to evaluate postfix/prefix expression. 4 Write a program to implement queue operations for linear, circular, and priority queue. 5 Write recursive program to implement factorial, Fibonacci sequence, GCD, and Tower of Hanoi algorithms. 6 Write a program to implement list using array and linked list. 7 Write a program for linked list implementation of stack and queue. 8 Write a program to implement sorting, searching and hashing algorithms. 9 Write a program to implement Binary Search Trees. 10 Write a program to implement searching, spanning tree.

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Syllabus of S. Y. B. Tech. (AIDS) Semester III

Course Code: AID222		Credits: 0-0-1
Course: Lab-II: Introduction to AI		Teachers Assessment: 25 Marks
Teaching Scheme: Practical: 02 Hrs/week		
Objectives	**:**	To apply various search algorithms of artificial intelligence. To implement different algorithms of Artificial Intelligence.
List of Practical	**:**	1. Study of PROLOG Programming and its Functions 2. Write a python program to solve Tower of Hanoi 3. Write a python program to implement Breadth First Search Traversal? 4. Write a python program to implement Depth first search? 5. Write a program to implement Hangman game using python. 6. Write a python program to solve 4-Queens problem 7. Write a program to solve Tic-Tac-Toe using Min-Max search 8. Write a python program to solve 8 Puzzle problems 9. Write a python program to solve Traveling salesman problem

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(Faculty of Science & Technology) **Syllabus of S. Y. B. Tech. (AIDS) Semester III**		
Course Code: AID223 Course: Lab-III: Object oriented programming Teaching Scheme: Practical: 02 Hrs/week		Credits: 0-0-1 Teachers Assessment: 25 Marks End Semester Examination / Oral: 25 Marks
Objectives	**:**	1. To implement Object Oriented Programming concepts using Java. 2. To implement packages, inheritance and interfaces. 3. To handle exceptions and use I/O streams 4. To design and implement simple Graphical User Interfaces
List of Practical	**:**	1. Develop a program to declare a class called 'student' having data members name, roll no and percentage. Accept and display this data for a single object. 2. Write a program to insert an element (specific position) into an array. 3. Write a program that creates box Object and use constructor overloading and return result to calling method. 4. Write a program that implements multilevel inheritance 5. Write a program for implementing an interface. 6. Write a program to create a package. 7. Write a program to handle Arithmetic exception. 8. Write a program for creating, opening, closing, reading and writing a file. 9. Write a program to create multiple threads. 10. Write a program to create an applet.

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Syllabus of S. Y. B. Tech. (CSE) Semester III

Course Code: AID224	Credits: 0-0-1
Course: Lab-IV: Microprocessors and Microcontrollers	
Teaching Scheme:	End Semester Examination / Oral: 25 Marks
Practical: 2 Hrs/week	

Objectives	:	1. To demonstrate the concept logic gates, design of combinational and sequential logic circuits 2. To use addressing modes & instruction set to implement programs for microprocessor and micro-controller
List of Practicals	:	1. Implementation of Boolean expression using AND/OR/NOT logic. 2. Implementation of Boolean expression using NAND/NOR logic. 3. Realization of Half & Full Adder using logic gates. 4. Realization of Half & Full Sub-tractor using logic gates. 5. Design & Implement 8:1 Multiplexer using logic gates. 6. Design & Implement 1:8 De-multiplexer using logic gates. 7. Demonstrate the working of flip-flop. 8. Write an Assembly language program to print the string in 8086. 9. Write an Assembly language program for 8-bit & 16-bit addition in 8086. 10. Write an Assembly language program for 8-bit &16-bit subtraction in 8086.

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Syllabus of S. Y. B. Tech. (CSE) Semester III	
Course Code: AID225	Credits: 0-0-1
Course: Lab-V Data Analytics Lab	Teachers Assessment: 25 Marks
Teaching Scheme:	
Practical: 2 Hrs/week	

Objectives	**:**	1. Understand the R Programming Language. 2. Exposure on visualizing data science problems. 3. Understand the classification and Regression Model.

List of Practical	**:**	1. **Introduction to R Programming and Study of basic Syntax in R**
		 2. **R as a Calculator application**
		  a. Using with and without R objects on console
		  b. Using mathematical functions on console
		  c. Write an R script, to create R objects for calculator application and save in a specified location in disk.
		 3. **Descriptive Statistics In R**
		  a. Write an R script to find basic descriptive statistics using summary, str, quartile function
		  b. Write an R script to find subset of dataset by using subset (), aggregate () functions on sample dataset
		 4. **Reading and Writing Different Types of Datasets**
		  a. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.
		  b. Reading Excel data sheet in R.
		  c. Reading XML dataset in R.
		 5. **Visualizations**
		  a. Find the data distributions using box and scatter plot.
		  b. Find the outliers using plot.
		  c. Plot the histogram, bar chart and pie chart on sample data
		 Study and implementation of various control structures in R and calculate mean mode median for a dataset
		 6. **Correlation and Covariance**
		  a. Find the correlation matrix.

b. Find the outliers using plot.

c. Plot the correlation plot on dataset and visualize giving an overview of relationships among data.

7. **Regression Model**

Import a data from web storage. Name the dataset and now do Linear/Logistic Regression to find out relation between variables that are affecting the admission of a student in an institute based on his or her entrance score

8. **Classification Model**

a. Install relevant package for classification.

b. Choose classifier for classification problem.

c. Evaluate the performance of classifier.

9. **Clustering Model**

a. Clustering algorithms for unsupervised classification.

b. Plot the cluster data using R visualizations.

10. **Mini Project**

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Syllabus of S. Y. B. Tech. AIDS (Semester III)

Course Code: HSM804	Credit: 0-0-0
Course: Constitution of India	
(Non-credit Mandatory course)	
Teaching scheme:	
Theory: 02 hrs. / week	

Prerequisite	Willingness to learn
Objectives	1.To create awareness about the constitution of India
	2. To know different sections/articles of the constitution of India and their significance.
Unit-I	Meaning and Concept of Indian Constitution; Nature of Constitution; Brief Idea of Indian Constitution [Parts, Articles and Schedule] **(02 Hrs)**
Unit-II	**Salient Features of Indian Constitution**
	Written and Enacted Constitution; The longest and most detailed Constitution of the World; Rigidity and Flexible Constitution; Parliamentary system of Government; Federal system with unitary bias; Adult Franchise; Single Citizenship; Sovereign, Democratic, Republic; Secularism; Directive Principles of State Policy; Independent Judiciary; Fundamental Rights; Fundamental Duties. **(05 Hrs)**
Unit-III	**A. Fundamental Rights**
	Concept of State (Art. -12); Right to Equality (Art. -14 to 18); Right to Freedom (Art. -19 to 22); Right against Exploitation (Art. -23 & 24); Right to Religion (Art. -25 to 28); Right of Minorities (Art. -29 & 30); Constitutional Remedies (Art.-32).
	Fundamental Duties (Art.-51 A) **(05 Hrs)**
Unit-IV	**Directive Principles of State Policy (DPSP's)**
	Meaning and Significance of Directive Principles; Classification/ Principles of D.P.S.P.; Relationship between F.Rs. and D.P.S.P. **(04 Hrs)**

Unit-V	Executives
	A) **Union Government**
	The President, Council of Ministers, and Prime Minister.
	B) **State Government**
	The Governor, Council of Ministers and Chief Minister (0**4 Hrs**)
Unit-VI	**Election Commission:** Election Commission: Role and Functioning; Chief Election Commissioner and Election Commissioners; State Election Commission: Role and Functioning; Institute and Bodies for the welfare of SC/ST/OBC and women. (**04 Hrs**)

References	Sr. No.	Title	Author	Publication	Edition
	1.	Constitution of India, Bare Act. Govt. of India	Constitution of India, Bare Act. Govt. of India	Constitution of India, Bare Act. Govt. of India	-
	2.	Our Constitution (AN Introduction of Indians Constitution and Constitutional tow,	Subhash C Kashyap	National Book Trust, India	2001
	3.	Indian Constitution,	Avasthi &, Maheshwarii	Lakshmi Narain Agrawal Agra,	2017
	4.	Introduction to the Constitution of India,	Basu D.D.,	Lexis Nexis,	2013
	5.	Indian Prime Minister	Sharma L.N.	the Macmillan Company of India,	1976
	6.	Union Executive,	Jain H.M.	Chaitanya Publishing House,	1969
	7.	Dr. B.R. Ambedkar, Framing of Indian Constitution (1 to 6 Volume)	Dr. S.N. Busi,	Ava Publishers	First Edition, 2016
	8.	Indian Constitution Law,	M.P. Jain,	Nexis	7th Edn. 2014
	9.	Outlines of Indian Legal and Constitutional History,	M.P. Jain,	Lexis Nexis,	2014

(Faculty of Science & Technology)	
Syllabus of S. Y. B. Tech. (Circuit Branches)	

Course Code:BSC251A/B	Credits: 3-1-0
Course: Complex variable &Vector Calculus	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs/week	Continuous In-semester Evaluation: 10 Marks
Tutorial: 01Hr/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs

Prerequisites	Basic formulae of trigonometry, Derivative, Integration, algebra of complex numbers, fundamentals of vector algebra.
Course Objectives	1. To develop the mathematical skills of the students related to function of complex variables. 2. To make the students familiarize with concept of vector differentiation and vector integration. 3. To apply mathematical concepts for solving the practical problems in engineering and technology.
Unit-I	**Function of Complex Variable** Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system , Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem, Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region, Singularities, Residues, Cauchy's residue theorem. (07 Hrs)
Unit-II	**Fourier Series** Definition, Dirichlet's conditions; Fourier series for function having period 2L; Fourier series for even and odd function, half range expansion; Fourier sine and cosine series. (06 Hrs)

Unit-III	**Fourier Transform**
	Fourier integral theorem (without proof), Fourier sine and cosine integral, Fourier sine and cosine transform, inverse Fourier transform, inverse Fourier sine and cosine transform. (05 Hrs)
Unit-IV	**Vector Differentiation**
	Differentiation of vectors, Scalar and Vector point functions, Gradient of a scalar point function, Directional derivative, Divergence and Curl of vector point function, Irrotational and Solenoidal vector fields. (06 Hrs)
Unit-V	**Vector Integration**
	Line integral, Work done by a force, Surface integral, Green's theorem, Stokes's theorem. (06Hrs.)
Unit-VI	**Z – Transform**
	Definition, Z-transform of elementary function, properties of Z-transform (without proof), Inverse Z transform: Partial fraction method, inversion integral method (Residue method), Solution of Difference equation by using Z-transform. (06Hrs)

	Sr. No.	Title	Author	Publication	Edition
References	1	Advanced Engineering Mathematics	Erwin Kreyszig	Wiley eastern Ltd	10th edition
	2	Higher Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill	1st edition
	3	Advanced Engineering Mathematics	C.R. Wylie	McGraw Hill Publications	6th Edition
	4	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publications	43th edition
	5	Applied Mathematics	P. N. Wartika& J. N. Wartikar	Pune VidyarthiGrihaPrakashan,Pune	9th edition
	6	A text book of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications	Laxmi Publications
	7	Advanced Engineering Mathematics.	H.K.Dass	S.Chand And Co.Ltd	18th edition

Maharashtra Institute of Technology, Aurangabad
(An Autonomous Institute)

<table>
<tr><td colspan="2">(Faculty of Science & Technology)
Syllabus of Second year B.Tech (AIDS) Semester-IV</td></tr>
<tr><td>Course Code: AID251
Course: Database Management System
Teaching Scheme:
Theory: 03 Hrs/week</td><td>Credits: 3-0-0

Mid Semester Examination-I: 15 Marks

Mid Semester Examination-II: 15 Marks

Continuous In-semester Evaluation: 10 Marks

Teacher Assessment: 10 Marks

End Semester Examination: 50 Marks

End Semester Examination (Duration): 02 Hrs</td></tr>
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Prerequisite	Knowledge of programming language.
Objectives	1. Understand database concepts, applications, data models, schemas and instances. 2. Use of SQL in querying the database 3. Learn the new emerging Technologies and Applications in database.
Unit-I	**Introduction** Database, Management Systems, Comparison with File Systems, Actors on the scene, Workers behind the scene, Advantages of using the DBMS Approach, A Brief History of Database Applications, When Not to use a DBMS Database System **Concepts and Architecture** - Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client /Server Architectures for DBMSs. (06 Hrs)
Unit-II	**Data Modelling** The importance of data models, Basic building blocks, Using High-Level Conceptual Data Models for Database Design, An example Database Application, Entity Types, Entity Sets, attributes and keys, Relation Types, Relationship Sets, roles and structural constraints, Weak Entity Types, Refining the ER Design for the Company Database, ER Diagrams, naming, conventions and design issues, Relationship Types of Degree Higher Than Two. (06 Hrs)
Unit-III	**Relational Database Design** Normalization, Need of Normalization, Functional Dependencies, Normal forms 1NF, 2NF, 3NF, BCNF, multi valued functional dependency and 4NF, properties of relational decomposition (06 Hrs)
Unit-IV	**Structures Query Language** Introduction, SQL Data Types and Literals, DDL, DML, DCL, TCL. SQL Operators, Tables:

	Creating, Modifying, Deleting. Views: Creating, Dropping, Updating using Views, Indexes. SQL DML Queries: SELECT Query and clauses, Set Operations, Joins, Tuple Variables, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. (06 Hrs)
Unit-V	**Fundamentals of Data Base Transaction Processing** Database Transactions: Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability, View, Concurrency Control: Need, Locking Methods, Deadlocks, Time stamping Methods (06 Hrs)
Unit-VI	**NoSQL** – Introduction, Distributed Systems, Advantages & Disadvantages of Distributed Computing, Scalability, What is NoSQL? Why NoSQL? RDBMS vs. NoSQL, Brief history of NoSQL, CAP theorem (Brewer's Theorem), NoSQL pros/cons, NoSQL Categories, Production deployment. (06 Hrs)

References	Sr. No.	Title	Author	Publication	Edition
	1.	Fundamentals of Database Systems	Ramez Elmasri, Shamkan B. Navathe,	Pearson Education, ISBN-9788131792476	Sixth edition
	2.	Database System Concepts	Silberschatz A., Korth H., Sudarshan S.	McGraw Hill Publishers, ISBN 0- 07-120413-X	6th Edition
	3.	Database Systems	Connally T, Begg C.	Pearson Education, ISBN 81-7808-861-4	4 th Edition
	4.	SQL Complete Reference	Paul N. Weinberg and Andy Oppel	McGraw Hill Publishers, ISBN: 9781259003882	3rd Edition

	(Faculty of Science & Technology)
	Syllabus of S. Y. B. Tech. (AIDS) Semester IV

Course Code: AID252	Credits: 3-0-0
Course: Data Communication and Networking	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs

Prerequisite	Students must have a working knowledge of fundamental data structures and associated algorithms.
Objectives	1. To focus on information sharing and networks.
	2. To introduce flow of data, categories of network, different topologies.
	3. Brief the students regarding protocols and standards.
	4. To give clear idea of signals, transmission media, errors in data communications
Unit-I	**Introduction to data communication and networking**
	Data Communication, Networks, Protocols and Standards, Standards Organizations, Topology, Transmission Modes, Categories of Networks Internet works. (06 Hrs)
Unit-II	**Study of Signals**
	Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals, Digital Signals. Types of transmission media: Guided Media, Unguided Media, Transmission Impairments. (06 Hrs)
Unit-III	**Introduction to Computer Network**
	Applications of computer networks, Functions of the layers OSI and TCP/IP, Wireless LANs: Wi-Fi (802.11) (06 Hrs)
Unit-IV	**Data Link Layer**
	Data Link Layer Design Issues, Error Detection and Correction: Types of Errors, Detection, Parity Check. Cyclic Redundancy Check, Checksum. (06 Hrs)
Unit-V	**Network Layer**
	Network classes, Repeaters, Hub, Bridges, Routers, Routing Algorithms, link state Routing,

		Distance Vector Routing.			(06 Hrs)
Unit-VI		**Application Layer Protocols** DNS, SMTP, FTP, HTTP			(06 Hrs)

	Sr. No.	Title	Author	Publication	Edition
References	1	Data communication & Networking	Bahrouz Forouzan.	McGraw Hill Education	5th Edition
	2	Data and Computer Communications	William Stallings	Pearson Education	8th Edition
	3	Computer Networks	Andrew S Tanenbaum	Pearson Education	4th Edition

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (AIDS) Semester IV

Course Code: AID253 Course: Discrete Mathematics& Graph Theory Teaching Scheme: Theory: 03 Hrs/week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous In-semester Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 02 Hrs

Prerequisite	Basic Mathematics.
Objectives	1. To understand Discrete Mathematical Structures (DMS) and graph theory for the development of theoretical computer science, problem solving in programming language using Discrete Structure 2. To understand the importance of discrete structures towards simulation of a problem in computer science and engineering
Unit-I	**Logic and proofs** Discrete Mathematics, Significance of Discrete Mathematics in Computer Engineering. Propositional Logic, Application of Propositional Logic, Logical Connectives, Propositional Equivalences, Predicates and Quantifiers, Proof Methods and Strategy, Mathematical Induction. (06 Hrs)
Unit-II	**Sets** Sets, Subsets, Venn Diagrams, Set Operations, Cardinality of Sets, Finite and Infinite Sets, Uncountable Infinite Sets, Principle of Inclusion and Exclusion. (06 Hrs)
Unit-III	**Relations and Functions** Relations – Definition, Properties of binary relations, N-ary Relations and their Applications, Representing Relations , Closures of Relations, Equivalence Relations, Partial Orderings, partitions, Hasse Diagram, Lattices, Chains and Anti-Chains, Recurrence relations. Functions- Surjective, Injective and Bijective functions, Inverse Functions and Compositions of Functions, The Pigeonhole Principle. (06 Hrs)
Unit-IV	**Counting** The Basics of Counting, rule of sum and product, Permutations, Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Algorithms for generating Permutations and Combinations. (06 Hrs)

Unit-V	**Graphs** Basic terminology, multi graphs and weighted graphs, Representation of graph, Operations on Graphs, Hamiltonian and Eulerian paths and circuits, Shortest path- Dijkstra's algorithm, Traveling salesman problem, Factors of a graph, Planer graphs, Graph Coloring. Trees: Introduction, Basic Terminology. (06 Hrs)	
Unit-VI	**Algebraic Structures** The Structure of Algebras, Semigroups, Monoids and Groups, Homomorphism and Normal Subgroups, Rings, Integral Domains and Fields, Polynomial Rings and Polynomial Codes. (06 Hrs)	

References

Sr. No.	Title	Author	Publication	Edition
1	Elements of Discrete Mathematics	C.L. Liu	Tata McGraw-Hill	3rd Edition
2	Discrete Mathematics and its Application	Kenneth H. Rosen	Tata McGraw-Hill	7th Edition
3	Discrete Mathematics with Applications	Susanna S. Epp.	Cengage Learning	4th Edition
4	Discrete Mathematics	R. Johnsonbaugh	Pearson Education	8th Edition
5	Discrete Mathematics with Graph Theory	E. Goodaire, M. Parmenter	Pearson Education	3rd Edition

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<tr><td colspan="2" align="center">(Faculty of Science & Technology)
Syllabus of S. Y. B. Tech. (AIDS) Semester IV</td></tr>
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Course Code: AID281 Course: Computer Graphics Teaching Scheme: Theory: 03 Hrs / week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous In-semester Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration):02 Hrs
Prerequisite	Graphics Concepts
Objectives	1. Use basic concepts of computer graphics 2. Apply the transformation algorithms to the basic shapes. 3. Perform processing of basic shapes by various processing algorithms 4. Acquire knowledge about drawing basic shapes such as lines, circle ellipse, polygon.
Unit-I	**Introduction and Overview of Graphics Systems** Use of Computer graphics, Video Display Devices, Refresh Cathode-Ray Tubes, Raster and Random Scan Displays, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Displays (06 Hrs)
Unit-II	**Input output Devices** Three-Dimensional Viewing Devices, Stereoscopic &Virtual Reality Systems, Raster and Random Scan Systems, Different Input and Hard Copy Devices, Graphics Software. (06 Hrs)
Unit-III	**2D Transformations** Introduction, Transformations (translation, rotation, scaling), matrix representation, rotation about an arbitrary point, homogeneous coordinates, composite transformations, reflection and shearing. (06 Hrs)
Unit-IV	**3D transformations** Windowing, Clipping: Window to view port transformations, 2D clipping, Cohen-Sutherland line clipping algorithm, Introduction to polygon, inside-outside test, 3D Projections, Three dimensional object representation , Parallel and Perspective

		Polygons, Splines, Quadric Surfaces (06 Hrs)
Unit-V		**Line, Circle and Character Generation**
		Basics concept in line Drawing, Line Drawing Algorithm, Digital Differential Analyzer, Bresenham's Line Algorithm, Antialiasing of Lines, Method of Antialiasing, Pixel Phasing, Representation of Circle ,Polynomial Method, Trigonometric Method, Circle Drawing Algorithm, DDA Circle Drawing Algorithm, Bresenham's Circle Drawing Algorithm. (06 Hrs)
Unit-VI		**Viewing**
		Classical three dimensional viewing, computer viewing, specifying views, parallel and perspective projective transformations .
		Animation
		Conventional and computer based animation, Methods of Controlling Animations,Basic guidelines of animation, Animation languages, Multimedia File Formats. (06 Hrs)

	Sr. No.	Title	Author	Publication	Edition
References	1	Computer Graphics with and OpenGL	Donald Hearn Pauline Baker	Prentice Hall, 2003	3rd Edition
	2	Interactive Computer Graphics. A Top-Down, Approach Using OpenGL	Edward Angel	Education Pearson 2008	5th Edition
	3	Computer Graphics	S. Harrington	McGraw-Hill Publications	2nd Edition

(Faculty of Science & Technology)	
Syllabus of S. Y. B. Tech. (AIDS) Semester IV	

Course Code: AID282 Course: Embedded System Teaching Scheme: Theory: 03 Hrs / week	Credits: 3-0-0 Mid Semester Examination-I: 15 Marks Mid Semester Examination-II: 15 Marks Continuous In-semester Evaluation: 10 Marks Teacher Assessment: 10 Marks End Semester Examination: 50 Marks End Semester Examination (Duration): 02 Hrs
Prerequisite	C Language, I/O, Analog and Digital interfacing, and peripherals.
Objectives	1 To equip the students with the basic concepts of embedded system, applications
Unit-I	**Fundamentals of Embedded System** Core of the embedded system, Memory, Sensors (resistive, optical, position, thermal) and Actuators (solenoid valves, relay/switch, opto-couplers), Communication Interface, Embedded firmware (RTOS, Drivers, Application programs), Power-supply (Battery technology, Solar), PCB and Passive components, Safety and reliability, environmental issues. (06 Hrs)
Unit-II	**Characteristics and quality attributes** (Design Metric) of embedded system. Real time system's requirements, real time issues, interrupt latency Embedded Product development life cycle, Program modeling concepts: DFG,FSM, Petri-net, UML Applications: Introduction, keyboards, Human Factor, Key Switch Factors, Keyboard Configurations, Displays, Seven-Segment Numeric Display, D/A and A/D Conversions. (06 Hrs)
Unit-III	**Embedded Software Development Tools** Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System. (06 Hrs)

Unit-IV	Basic embedded C programs/applications for ARM-v7, using ARM-GCC-tool-chain, Emulation of ARM-v7 (e.g. using QEMU), and Linux porting on ARM-v7 (emulation) board CASE STUDY: 1) Medical monitoring systems, 2) Process control system (temp, pressure) 3) Soft real time: Automated vending machines, 4) Communication: Wireless (sensor) networks. (06 Hrs)
Unit-V	**Real time operating system** POSIX Compliance , Need of RTOS in Embedded system software, Foreground/Background systems, multitasking, context switching, IPC, Scheduler policies, Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS. (06 Hrs)
Unit-VI	**The 8051 Architecture** Introduction, 8051 Micro controller Hardware, Input/output Pin Ports and Circuits, External Memory, Serial data Input/output, Interrupts. Basic Assembly Language Programming Concepts: The Assembly Language Programming, Process, Programming Tools and Techniques, Programming the 8051. (06 Hrs)

	Sr. No.	Title	Author	Publication	Edition
References	1	Embedded system-Architecture, Programming, Design	Rajkamal	Mc Graw Hill Edu	3rd Edition
	2	Embedded system Design	Peckol	John Wiley&Sons	3rd Edition
	3	Embedded Systems-An Integrated Approach	Lyla B Das	Pearson	3rd Edition
	4	Embedded Microcomputer Systems – Real Time Interfacing	Jonathan W. Valvano	Cengage Learning;	3rd Edition
	5	Micro Controllers	Ajay V Deshmukhi	Tata Mc Graw Hill.	3rd Edition

(Faculty of Science & Technology)	
Syllabus of S. Y. B. Tech. (AIDS) Semester IV	

Course Code: AID283	Credits: 3-0-0
Course: Human Computer Interaction	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 03 Hrs / week	Continuous In-semester Evaluation: 10 Marks
	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 02 Hrs

Prerequisite	Fundamentals of programming, computer interfaces, interface design
Objectives	1. To introduce fundamental concepts of human computer interaction. 2. To understand the importance good interface design, users and their interaction with computers 3. To become familiar with the design technologies for individuals and persons with disabilities. 4. To understand design principles, models and evaluation techniques in user interface design.
Unit-I	**Introduction** The Human, The Computer, The interaction, Paradigms, Guidelines, Principles, and Theories, Importance of good design, Examples : Identifying good vs bad design (06 Hrs)
Unit-II	**Design Process** Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support (06 Hrs)
Unit-III	**Models and Theories** Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design (06 Hrs)
Unit-IV	**Interaction Styles**

	Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation (06 Hrs)				
Unit-V	**Design Issues** Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization (06 Hrs)				
Unit-VI	**Outside the Box** Group ware, Ubiquitous computing and augmented realities, Hypertext, multimedia, and the world wide web (06 Hrs)				
References	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1	"Human Computer Interaction"	Alan Dix, Janet Finlay	Pearson Education	2004, Third Edition
	2	"Designing the User Interface - Strategies for Effective Human Computer Interaction"	Ben Shneiderman	Pearson Education	2010, 5th Edition
	3	"Interaction Design: beyond Human Computer Interaction"	Helen Sharp, Rogers, Preece	Wiley publications	3rd Edition

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (AIDS) Semester IV

Course Code: AID271	Credits: 0-0-1
Course: Lab-I: Database Management System Teaching Scheme: Practical: 03 Hrs/week	End Semester Examination / Oral: 25 Marks

Prerequisite	Knowledge of programming language.
Objectives	1. Creation of Database, tables using DDL, DML SQL commands. 2. Applying keys and constraints on tables. 3. Retrieving data using wild cards and pattern matching. 4. Perform various data manipulation commands, aggregate functions and sorting techniques. 5. Apply the concept of Aggregating Data using group by and having clause. 6. Use of set operators to combine the result of multiple queries. 7. Solve queries using the concept of sub query. 8. Displaying data from multiple tables using Joins. 9. Implementation of Views. 10. Implementation of Stored Procedure. 11. Apply the concept of security and privileges.
Software	• Any ERD Design Tool (like dbdiagram.io.,draw.io.,Lucidchart. • Any SQL interface (like Oracle, MySQL, Postgres., etc).

	Sr. No.	Title	Author	Publication	Edition
References	1	SQL, PL/SQL the Programming Language of Oracle	Ivan Bayross	BPB Publications	4 th Edition
	2	Learning SQL: Master SQL Fundamentals	Alan Beaulieu	O'reilly	2 nd Edition

(Faculty of Science & Technology)
Syllabus of S. Y. B. Tech. (AIDS) Semester IV

Course Code: AID272	Credits: 0-0-1
Course: Lab-II: Data Communication and Networking	Teacher Assessment: 25 Marks
Teaching Scheme:	
Practical: 02 Hrs/week	

Objectives	To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices.
List of Practical	1. Study of Network Components. 2. Study of Analog and Digital Signals. 3. Study of Network Topologies. 4. Case study on Camus wide Network. 5. Run basic utilities and network commands: ipconfig, ping, tracert, netstat 6. Design a WLAN using wireless router or access point and add 3-4 host in network. Simulate using Packet Tracer. 7. Simulate the working Routing Information Protocol (RIP) using Packet tracer 8. Simulate the working Open Shortest Path First (OSPF) .using Packet tracer 9. Write a program in C language for calculating the shortest path using Link State Routing Algorithms 10. Study of Application Layer protocol

(Faculty of Science & Technology) Syllabus of S. Y. B. Tech. (AIDS) Semester IV	
Course Code: AID273	Credits: 0-0-1
Course: Lab-III: Web Development	End Semester Examination / Oral: 25 Marks
Teaching Scheme: Practical: 02 Hrs/week	

Objectives	1. Programming skills in Html5, CSS3, Bootstrap 4.
	2. Developing skills of Web Applications user interactions using JavaScript, PHP
	3. Web application Development Database with React and React Native.

List of Practical	1. **HTML LAYOUTS AND LINKS**
	• Develop a web application to control over different layouts.
	• Create a webpage with HTML describing your department use paragraph and list tags.
	• Apply various colors to suitable distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
	• Create links on the words e.g. "Wi-Fi" and "LAN" to link them to Wikipedia pages.
	2. **WEB APLLICATION DESIGN FORMTTING**
	• Develop a web application with background banner image and navigation menus.
	• Develop a web application with responsive images.
	• Develop a web application using left menu.
	• Develop setting to change the theme of entire web Application.
	3. **INTRODUCTION TO RESPONSIVE INTERFACE USING BOOTSRAP.**
	Write code for developing responsive web application with Admin panel and

tables with static data.

4. BUIDLING INTERFACES USING JAVASCRIPT

Write JavaScript to validate the following fields of the Registration page.

- First Name (Name should contains alphabets and the length should not be less than 6 characters). Password (Password should not be less than 6 characters length).
- E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
- Mobile Number (Phone number should contain 10 digits only).
- Last Name and Address (should not be Empty).

5. INTRODUCTION TO INTERATIVE FORMS

- Developing Web Page Styles using JavaScript and CSS,
- Develop Script interactive forms

6 . PHP

- A web application that takes a name as input and on submit it shows a hello page where name is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You message with the duration of usage (hint:Use session to store name and time).
- A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary

7**. Database Handling**

Implement the web applications with Database using PHP

8. Mini project based on above technologies.

	Sr. No.	Title	Author	Publication	Edition
References	1	"Beginning Web Programming",	Jon Duckett,	WROX,	2nd Edition,
	2	"Java Script"	D. Flanagan	O'Reilly,	6th Edition
	3	"Java Server Pages",	W Hans Bergsten	O'Reilly,	3rd Edition,

	Faculty of Science & Technology
	Syllabus of S. Y. B.Tech. All Branches (Semester IV)

Course Code: HSM254	Credits: 0-0-1
Course: Development of Skills (Soft Skills)	Teacher Assessment: 25 Marks
Practical: 02 Hrs/week	End Semester Examination (Online): 25 Marks

Objectives	1. Students will be able to communicate in English accurately and effectively. 2. Students will be able to enhance employability skills. 3. Students will be able to participate in debate and group discussion in English effectively. 4. Students will be able to enhance verbal ability. 5. Students will be able to face interview effectively.
Unit-I	**Common Errors in English Communication** • Grammatical • Spelling • Pronunciation (02 Hrs)
Unit-II	**Enhancing Employability skills** • Job application • Resume / CV • Essay • Reading Comprehension (06 Hrs)
Unit-III	**Debate and Group Discussion** • Communication • Appearance • Preparation (04 Hrs)
Unit-IV	**Verbal Ability-I** • Synonyms • Antonyms • Idioms and Phrases (04 Hrs)
Unit-V	**Verbal Ability-II** • One word substitution

		Word analogy			(04 Hrs)
Unit-VI		**Interview Skills** • Body language • Grooming • Preparation			 (04 Hrs)
Textbooks/ Reference Books	**Sr. No.**	**Title**	**Author**	**Publication**	**Edition**
	1.	Verbal and Non-Verbal Reasoning	R.S. Agrawal	S. Chand Publication	2018
	2.	Effective Technical Communication	Anne Eisenberge	Mc Graw Hill International Editors	1982
	3.	Professional Communication Skills	A. K. Jain, Pravin, S. R. Bhatia, A. M. Sheikh	S. Chand & Company Ltd.	2001
	4.	Business Communication	Urmila Rai, S. M. Rai	Himalaya Publishing House	2011
	5.	Better English Pronunciation	J.D. O'Connor.	Cambridge University Press	1980
	6.	Grammar of Spoken and Written English	Dauglas Biber, Geoffrey Leech	Longman	1999
	7.	Technical Communication- Principles and Practice	Meenakshi Raman & Sangeeta Sharma	Oxford University Press	2004
	8.	A course in Phonetics & Spoken English	J. Sethi, P.V. Dhamija	PHI publication	2006
	9.	Communication Skills for Engineers	Sunita Mishra, C. Murli Krishna	Pearson Education	2011

10.	Soft Skills: Enhancing Employability: Connecting Campus with Corporate	M.S. Rao	I.K. International	2013
11.	Technical Communication A Reader Centered Approach	Paul V. Anderson	Thomson Publication	2007
12.	Oxford English Grammar	Sydney Greenbaum	Oxford University Press	1996

(Faculty of Science & Technology)

Syllabus of S. Y. B. Tech. (AIDS) Semester IV

Course Code: AID274	Credits: 0-0-1
Course: Lab-V: Problem Based Learning	Teacher Assessment: 25 Marks
Teaching Scheme: Practical: 02 Hrs/week	

Course Objectives:

On completion of the course, learner will be able to –

- To develop positive attitude, new skills or new ways of thinking.
- To introduce independent and group learning by solving real world problem with the help of available resources.
- To be able to develop systematic approach in technical documentation.
- To select and utilize appropriate Software tools/Equipment/Problem solving tools to solve real life problems.

Guidelines:

The students plan, manage and complete a activity which addresses the stated problem.

1. The students must work in group to solve real life problem.

2. A mentor to be assigned to 3-4 groups / one batch.

3. The steps to be followed for problem based learning are as mentioned below:

Step 1: Explore the issue.

Gather necessary information; learn new concepts, principles, and skills about the proposed topic.

Step 2: State what is known.

Individual students and groups list what they already know about the scenario and list what areas they are lacking information.

Step 3: Define the issues.

Frame the problem in a context of what is already known and information the students expect to learn.

Step 4: Research the knowledge.

Find resources and information that will help create a compelling argument.

Step 5: Investigate solutions.

List possible actions and solutions to the problem, formulate and test potential hypotheses

Step 6: Present and support the chosen solution.

Clearly state and support your conclusion with relevant information and evidence.

Step 7: Review your performance.

Often forgotten, this is a crucial step in improving the problem-solving skills. Students must evaluate their performance and plan improvements for the next problem.

Recommended parameters for assessment, evaluation and weightage:

1. Identification of the Problem (20%)
2. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents). (30%)
3. Demonstration (Poster Presentation/Model Exhibition etc). (20%).
4. Awareness /Consideration of - Environment/ Social /Ethics/ Safety measures/Legal aspects. (10%)
5. Outcome (Participation in technical events / publication in national international conference journal/copyright/patent/prototype). (20%)

Reference Books/ Research Articles:	Sr. No.	Title	Author
	1	A new model of problem based learning	Terry Barrett
	2	Research Methodology: Methods and Techniques	C. R. Kothari
Web Resources:		1. Problem-Based Learning: https://www.coursera.org/lecture/university-teaching/problem-based-learning-i-pbl-in-practice-SMXol 2. Problem-Based Learning: https://onlinecourses.swayam2.ac.in/ntr20_ed29/preview	

Faculty of Science & Technology	
Syllabus of S. Y. B.Tech. All Branches (Semester IV)	
Course Code: HSM805	Credits: 0-0-0
Course: Non-Credits Mandatory course (Professional Ethics and Corporate Social Responsibility)	
Teaching Scheme:	
Theory: 02 Hrs/week	

Objectives	1 To develop understanding of professional ethics in different organizational context.
	2 To identify, analyze, and resolve ethical issues in business decision making.
	3 To develop various corporate social Responsibilities and practice in the professional life
Unit-I	**Professional Ethics and Business**
	The Nature of Business Ethics; Ethical Issues in Business; Moral Responsibility and Blame; Utilitarianism: Weighing Social Costs and Benefits; Rights and Duties of Business. (04 Hrs)
Unit-II	**Professional Ethics in the Marketplace**
	Perfect Competition; Monopoly Competition; Oligopolistic Competition; Oligopolies and Public Policy Professional Ethics and the Environment: Dimensions of Pollution and Resource Depletion; Ethics of Pollution Control; Ethics of Conserving Depletable Resources. (04 Hrs)
Unit-III	**Professional Ethics of Consumer Protection**
	Markets and Consumer Protection; Contract View of Business Firm's Duties to Consumers; Due Care Theory; Advertising Ethics; Consumer Privacy. (04 Hrs)
Unit-IV	**Introduction to Corporate Social Responsibility:** Corporate Social Responsibility: Concept, Scope, Relevance, Importance of CSR in Contemporary Society. CSR, Indian Corporations - Legal Provisions and Specification on CSR, A Score Card, Future of CSR. (04 Hrs)
Unit-V	**Potential Business Benefits**
	Triple bottom line, Human resources, Risk management, Supplier relations; Criticisms and concerns—Nature of business; Motives; Misdirection. (04 Hrs)
Unit-VI	**Corporate Social Responsibility:** Corporate Social Responsibility and Small and Medium Enterprises (SMEs) in India, Corporate Social Responsibility and Public-Private Partnership (PPP) in India. (04 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Business Ethics: Texts and Cases from the Indian Perspective	Ananda Das Gupta	Springer	2014
	2.	Business Ethics: Concepts and Cases	Manuel G. Velasquez.	Pearson	2014
	3.	Corporate Social Responsibility: Readings and Cases in a Global Context	Andrew Crane, Dirk Matten, Laura Spence;	Routledge	2013
	4.	Corporate Social Responsibility in India	Bidyut Chakrabarty	Routledge	2015

Faculty of Science & Technology
Syllabus of S. Y. B.Tech. All Branches (Semester IV)

Course Code: HSM806	Credits: 0-0-0
Course: Non-Credits Mandatory course (Emotional Intelligence) Teaching Scheme: Theory: 02 Hrs/week	

Objectives	1. To interpret and manage emotions. 2. To learn the four core skills required to practice emotional intelligence. 3. To relate emotional intelligence to the workplace.
Unit-I	Introduction to emotion, Development of emotions and emotional maturity, intelligence & wisdom, Science of Emotional Intelligence, EQ and IQ (04 Hrs)
Unit-II	Concept, theory, measurement and applications of intelligence, Dimensions of Trait EI Model: Self-awareness, Self-regulation, Motivation, Empathy, Social skills. (4 Hrs)
Unit-III	Emotional intelligence: concept, theory and measurements, Correlates of emotional intelligence (04 Hrs)
Unit-IV	Emotional intelligence, culture, schooling and happiness, Emotional Intelligence at Work place: Importance of Emotional Intelligence at Workplace? Cost–savings of Emotional Intelligence. (04 Hrs)
Unit-V	For enhancing emotional intelligence EQ mapping, Managing stress, suicide prevention, through emotional intelligence, spirituality and meditation. (04 Hrs)
Unit-VI	Application of emotional intelligence at family, school and workplace, Case Studies Measuring Emotional Intelligence: Emotionally Intelligent Tests. (04 Hrs)

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Emotional Intelligence- Why it can Matter More than IQ	Daniel Goleman	Bantam Doubleday Dell Publishing Group	1996
	2.	Working with Emotional Intelligence	Manuel G. Velasquez.	Bantam Doubleday Dell Publishing Group	2000
	3.	Emotional Intelligence Coaching	Liz Wilson, Stephen Neale & Lisa Spencer-Arnell	Kogan Page India Private Limited	2012
	4.	Corporate Social Responsibility in India	Bradberry, Travis and Jean Greaves	Perseus Books Group	2009

Faculty of Science & Technology		
Syllabus of S. Y. B.Tech. All Branches (Semester II)		
Course Code: HSM807 Course: Non-Credits Mandatory course (Stress Management Through Yoga) Teaching Scheme: Theory: 02 Hrs/week		Credits: 0-0-0
Objectives	1 To identify common stressors inherent in today's global marketplace. 2 To develop an understanding of the impact of stress on physiological, emotional and cognitive processes. 3 To learn to manage the stress through art of Yoga	
Unit-I	Mental Health: Meaning and Importance; Yogic Perspective of Mental Health, Indicators of Mental Health, Stress: Meaning and Definition; Symptoms, Causes and Consequences of Stress, Meaning of Management – Stress Management, Stress in Modern Culture & Society. (06 Hrs)	
Unit-II	Concept of Stress according to Yoga, Assessing your Stress & Building Resilience. (03 Hrs)	
Unit-III	Physiology of Stress on: Autonomic Nervous System (ANS), Endocrine System, Hypothalamus, Cerebral Cortex and Neurohumours. (03 Hrs)	
Unit-IV	Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. Role of Meditation & Pranayama on stress - physiological aspect of Meditation, Constant stress & strain, anxiety. (04 Hrs)	
Unit-V	Meaning and definition of Health: various dimensions of health (Physical, Mental, Social and Spiritual) - Yoga and health -Yoga as therapy. Physical fitness. Stress control exercise - Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage. (05 Hrs)	
Unit-VI	Preventive and curative effects of Yoga on stress related disorders: Hypertension, Heart problems, Bronchial Asthma, Peptic Ulcer, Diabetes Mellitus, Arthritis, Anxiety Neurosis and Headache (03 Hrs)	

Textbooks / Reference Books	Sr. No.	Title	Author	Publication	Edition
	1.	Stress Control for peace of Mind	Linda Wasmer Andrews	Main Street	2005
	2.	Yoga for stress	Vimla Lalvani	Hamlyn	1998
	3.	Yoga perspective in stress management	H.R. Nagendra, and R. Nagarathana,	Swami Vivekananda Yoga Prakashana	2004
	4.	Yoga practices for anxiety & depression	H.R. Nagendra, and R. Nagarathana,	Swami Sukhabodhanandha Yoga Prakashana	2004
	5.	Stress management by Yoga	K.N. Udupa,	Motilal Banaridass Publishers Private Limited.	1996