Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad
(An Empowered Autonomous)
Accredited by NAAC with 'A' grade (3.63 CGPA) Grade, ISO 9001:2015 Certified
Affiliated to Shivaji University, Kolhapur

Bachelor of Science

Part - I

Artificial Intelligence (Entire)

Syllabus

To be implemented
w.e.f. June, 2024

NEP 2024

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad (Autonomous)
Department of Artificial Intelligence (Entire)
Syllabus for Bachelor of Science Part-I

1. **TITLE:** ARTIFICIAL INTELLIGENCE (ENTIRE)

2. **YEAR OF IMPLEMENTATION:** New Syllabi for the B.Sc. I Artificial Intelligence (Entire) will be implemented from June 2023 onwards.

3. **PREAMBLE:**
   Bachelor of Science is an integrated academic degree in the faculty of science. The revision of existing syllabus of Artificial Intelligence subject in Science Faculty is essential. This is a humble endeavor to initiate the process towards an era of knowledge. Intelligent machines have replaced human capabilities in many areas. Artificial intelligence is the intelligence exhibited by machines or software. It is the branch of computer science that emphasizes on creating intelligent machines that work and reacts like humans. This course is designed to span a wide variety of topics in computer science research, including machine learning, Game playing, Expert Systems etc.

4. **GENERAL OBJEVTIVES OF THE COURSE:**
   1) To undertake industry careers involving innovation and problem-solving using software and other information technologies.
   2) To undertake research careers in Computer Sciences and allied areas.
   3) To contribute to society by becoming a model professional who can communicate effectively and observes ethical behavior
   4) To inculcate the software development attitude and generate interest in the field of Technology.
   5) To develop programming skills, management skills, writing skills, Project Analysis skill among students.

5. **PROGRAM SPECIFIC OUTCOMES (PSO's):**
   1) Ability to contribute to problem identification, analysis, design, and development of systems using principles and concepts of Artificial Intelligence and Machine Learning.
   2) Apply the concepts and practical knowledge in analysis, design and development of computing systems and applications to multi-disciplinary problems.
   3) To provide a concrete foundation and enrich their abilities to qualify for Employment, Higher studies and Research in Artificial Intelligence and Data science with ethical values.
   4) Ability to use Artificial Intelligence and Machine Learning models on data for enabling better decision making.

6. **DURATION:** The course shall be a full-time course.

7. **PATTERN:** Semester

8. **MEDIUM OF INSTRUCTION:** ENGLISH

Course Structure for B.Sc. I (Semester-I)

Theory				Practical				
Course Title	**Course Code**	**Lecture per week**	**Credits**	**Course**	**Course Title**	**Course Code**	**Lecture per week**	**Credits**
Introduction of Artificial Intelligence	BAIT 24 -101		2	Practical –2	Artificial Intelligence and Database Systems Lab	BAIP 24-103	4	2
Database Systems	BAIT 24-102	5	2					
Fundamental of Computers	BAIT 24 -104		2	Practical –2	Fundamental ofComputers and C programming Lab	BAIP 24-106	4	2
Programming in C	BAIT 24-105	5	2					
Computational Statistics-I	BAIT 24-107		2	Practical -1	ComputationalStatistics-I And Computational Statistics-II Lab	BAIP 24-109	4	2
Computational Statistics-II	BAIT 24 -108	5	2					

Course Structure for B.Sc. I. (Semester-II)

Theory				Practical				
Course Title	**Course Code**	**Lecture per week**	**Credits**	**Course**	**Course Title**	**Course Code**	**Lecture per week**	**Credits**
Artificial Intelligence-II	BAIT 24-201	5	2	Practical –2	Object Oriented Programming using python and Artificial Intelligence-II Lab	BAIP 24-203	4	2
Object Oriented Programming using python	BAIT 24-202		2					
Operating System	BAIT 24-204	5	2	Practical –2	Web Technologies Lab	BAIP 24-206	4	2
Web Technologies	BAIT 24-205		2					
Foundational Mathematics for AI	BAIT 24-207	5	2	Practical -2	Mathematics Lab Course-I	BAIP 24-209	4	2
Linear algebra	BAIT 24 -208		2					

Structure and Title of Courses of B.Sc. Course:

B.Sc. I Semester I

Course Number	Course Code	Course Name
Subject-I DSCI:	BAIT24-101	Introduction to Artificial Intelligence
Subject-I DSCII	BAIT24-102	Database System
Subject-I Practical-I	BAIP24-103	Practical based on DSCI and DSCII
Subject-II DSCI:	BAIT24-104	Fundamentals of Computer
Subject-II DSCII	BAIT2-4105	Programming in C
Subject-II Practical-I	BAIP24-106	Practical based on DSCI and DSCII
Subject-III DSCI:	BAIT24-107	Computational Statistics-I
Subject-III DSCII	BAIT24-108	Computational Statistics-II
Subject-III Practical-I	BAIP24-109	Practical based on DSCI and DSCII

Structure and Title of Courses of B.Sc. .Course:

B.Sc. I Semester II

Course Number	Course Code	Course Name
Subject-I DSCIII:	BAIT24-201	Artificial Intelligence-II
Subject-I DSCIV	BAIT24-202	Object Oriented Programming in python
Subject-I Practical-II	BAIP24-203	Practical based on DSCIII and DSCIV
Subject-II DSCIII:	BAIT24-204	Operating System
Subject-II DSCIV	BAIT24-205	Web Technologies
Subject-II Practical-II	BAIP24-206	Practical based on DSCIV
Subject-III DSCIII:	BAIT24-207	Foundational Mathematics for AI
Subject-III DSCIV	BAIT24-208	Linear algebra
Subject-III Practical-II	BAIP24-209	Practical based on DSCIII and DSCIV

B.Sc. I- Semester-I

Theory: Course- I: BAIT101: Introduction to Artificial Intelligence

Course Objectives: Students should be able to…

1. To understand the fundamental concepts and history of artificial intelligence, components of AI Programs and its foundational principles.
2. To explore the various types of intelligent agents.
3. To learn different search strategies in AI.
4. To Gain insights into knowledge representation in AI.
5. To Explore real-world applications of AI

Credits=2	**SEMESTER-I** **Course- I: BAIT101: Introduction to Artificial Intelligence**	No. of hours per unit/ credits
Unit I	**Introduction and to Artificial Intelligence**	(16)
	Introduction to Artificial Intelligence: Introduction, Brief History- Intelligent Systems- Categorization of Intelligent Systems- Components of AI Program- Foundations of AI- Sub-areas of AI- Applications Development of AI Languages- Current Trends in AI- Future of AI **Intelligent Agents:** Intelligent Agents: Rational Agents- Mapping from Sequences to Actions- Properties of Environments Structure of Intelligent Agents- Types of Agents: Simple Reflex Agents- Goal Based Agents- Utility Based Agents.	
Unit II	**Knowledge Representation**	(16)
	Knowledge Representation -Procedural versus Declarative Knowledge – Logic Programming – Forward Versus Backward Reasoning – Matching – Control Knowledge –Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoning with Default Information. **Applications of AI:** Applications of AI- Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception	

Course Outcomes: Students will be able to…

1. Remember the foundational concepts and historical developments in Artificial Intelligence.
2. Understand the principles of intelligent agent design.
3. Apply search strategies effectively, distinguishing between uninformed and informed methods to solve AI problems.
4. Analyze different approaches to knowledge representation in AI.
5. Evaluate the diverse applications of AI in various domains.

Reference Books:

1. Stuart Russell, peter Norvig (2020), Artificial Intelligence: A Modern Approach, 4th Edition, University of California at Berkeley, Pearson education.

2. Miguel Grinberg (2018), "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media. ISBN-13: 978-1491991732

3. B. Yagna Narayana, "Artificial Neural Networks", PHI, 2005. Dan W. Patterson.

4. "Artificial Intelligence and Expert Systems," Pearson Education, 2018. Joseph C. Giarrantano, Gary D. Riley.

5. "Expert Systems: Principles and Programming," Course Technology Inc, 4th Edition, 2004. Ivan Bratko.

6. Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition

Theory: Course II: BAIT102: Database Systems

Course Objectives: Students should be able to…

1. Understand various basics of DBMS and query languages.
2. Learn different types of database systems and their applications in different scenarios.
3. Identify the process of drawing the ER-Diagrams.
4. Study of the importance of database analysis and learn any database application.

Credits=2	SEMESTER-I Course II: BAIT102: Database Systems	No. of hours per unit/ credits
UNIT I	**Introduction of DBMS:**	(15)
	Basic Concept (Dada vs. Information, Database), Definition of DIMS, Needs and Features of D BMS. Comparison of file processing system with DBMS, functions of DBMS. Advantages and disadvantages of DBMS, Structure of DBMS, Architecture of database system, Data abstraction, data independence, users of databases. **Data Models**: Introduction, definition, features of data models, DFD. Object based data models- Entity Relationship Model, Cardinality. Record based models. Hierarchical Model, Network Model, Relational Model and Physical Data Models	
UNIT II	**Database Management through MySQL**	(15)
	SQL: Introduction of SQL, features, SQL data types. DDL commands- create table, describe table, alter table, drop table commands etc., DML- insert, delete, update commands etc., DQL commands- All select commands, functions, clauses. Introduction of MySQL, features, database creation, table creation, insert records. Keys: Primary key, foreign key, candidate key, super key. Unique keys. **Organization of Database System**: Introduction of file, file types, organization of files, Types of Database System: Centralized database System, client-server system, distributed database system.	

Course Outcomes: - Students will be able to…

1. Apply the basics of databases and data management.
2. evaluate various theoretical and practical principles involved in the design and use of databases systems with the help of database
3. Design and implement databases for various scenarios.

Reference Books:

1. Abraham Silber schatz, Henry F. Korth, S. Sudharshan, (2006), Database System Concepts,Tata McGraw Hill
2. Elmsari and Navathe (2013), Fundamentals of Database Systems, Pearson Education.
3. Ramakrishnan and Gehrke, (2003), Database Management Systems, McGraw Hill
4. C.J. Date, A. Kannan, S. Swamynathan, (2006), "An Introduction to Database Systems",Pearson Education
5. R.P. Mahapatra (2016), Database Management Systems, Khanna Book Publishing.

B.Sc. I- Semester-I
Practical-I
Lab Course I: BAIP103: Lab based on BAIT101 and BAIT102

Course Objectives: Students should be able to…

1. Study of awareness of fundamental understanding of various applications of AI techniques
2. Understand the various steps in program development.
3. Learn different types of database systems and their applications in different scenarios.
4. Identify the process of drawing the ER-Diagrams.
5. Study of the importance of database analysis and learn any database application.

Credits=2	SEMESTER-I LabCourseI-BAIP103: Lab based on (BAIT101andBAIT102)	No.of. hours. Per unit/ credits (60)
Part A:	**Introduction to Artificial Intelligence**	

	1. Create an AI Powered chatbot & incorporate below mentioned points
	
	    a) Define the Purpose of Your Chatbot
	    b) Choose a Chatbot Platform (for ref. given below)
	        (Chatbot.com, Chat fuel, Many Chat, Tidio)
	    c) Set Up Your Chatbot
	    d) Design Conversation Flows
	    e) Add Responses
	    f) Incorporate Basic AI Elements
	    g) Test Your Chatbot
	
	2. Use user-friendly AI tools like Google Teachable Machine or image recognition apps. Upload images and see how the AI categorizes them.
	
	3. Conduct the search on different search engines (e.g., Google, Bing, Duck Duck Go, and Yahoo). Record the top results and analyze the differences in sources and information quality.
	
	4. Design an algorithm for intelligent agent (Sketch and outline) It should include Name, Purpose Characteristics, Types, Functionality.
	
	(Design algorithm for simple reflex, goal-based, utility-based agents)	

Part B:	**Database systems**	
	1. Write Procedure for creating database in MYSQL. 2. Create tables for the information given below by giving appropriate DDL, DML commands 3. Create tables for the information given below by giving appropriate DCL, TCL commands 4. Create tables for the information given below by giving appropriate integrity constraint as specified. 5. Create tables for the information given below by choosing appropriate data types and integrity constraint as specified. 6. Implementation of queries and sub queries 7. Implement normal forms in a database.	

| | 8. Create the following tables (primary keys are underlined). Property (pno, description, area) .Owner (oname, address, phone)

An owner can have one or more properties, but a property belongs to exactly one owner. Create the relations accordingly, so that the relationship is handled properly and the relations are in normalized form (3NF).

a) Insert two records into owner table.
b) insert 2 property records for each owner
c) Update phone no of "Mr. Nene" to 9890278008
d) Delete all properties from "pune" owned by" Mr. Joshi"
9. Create the following relations, for an investment firm emp (emp-id, emp-name, address, bdate) Investor (inv-name, inv-no, inv-date, inv-amt)
An employee may invest in one or more investments; hence he can be an investor. But an investor need not be an employee of the firm. Create the Relations accordingly, so that the relationship is handled properly and the relations are in normalized form (3NF). Assume appropriate datatypes for the attributes. Add any new attributes, as required by the queries. Insert sufficient number of records in the relations / tables with appropriate values as suggested by some of the queries.
Write the following queries & execute them.
1. List the distinct names of customers who are either employees, or investors or both.
2. List the names of customers who are either employees, or investors or both.
3. List the names of employees who are also investors.
4. List the names of employees who are not investors.
10. To understand & get a Hands-on on nested queries & sub queries, that involves joining of tables. | |

Course Outcomes: -Students will be able to…

1. Use MySQL and design database
2. Perform operations on data using MySQL features.
3. Demonstrate normalization techniques with simple examples.

Reference Books:

1. P. K. Sinha & Priti Sinha(2022), Foundations of Computing(BPB)
2. Yashwant Kanetkar (2021), Let Us C: Authentic guide to C programming language (18th Edition)
3. Stuart Russell, peter Norvig (2020), Artificial Intelligence: A Modern Approach, 4th Edition,University of California at Berkeley, Pearson education.
4. CharlesDierbach, (2013), "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition
5. Kenneth A. Lambert (2012), "Fundamentals of Python: First Programs", CENGAGE Learning.
6. David L. Poole and Alan Mackworth, (2010), Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press.

B.Sc. I-Semester-I
Theory: Course I-BAIT104: Fundamentals of Computers

Course Objectives: - Students should be able to…
1. Study the basics of computer.
2. Learn algorithm, Flowchart and Pseudo code with Examples.
3. Understand the fundamentals of operating systems.
4. Identify Web Basics and internet features.

Credits=2	SEMESTER-I Course I-BAIT104: Fundamentals of Computers	No. of hours per unit/ credits
UNIT I	**Fundamentals of Computer**	(16)
	Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organization of a Digital Computer; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs– Assembler, Interpreter and Compiler; Planning Computer Program- Algorithm, Flowchart and Pseudo code with Examples **Introduction to Computers:** Input and Output Devices: Keyboard, mouse, touch screen, joystick, scanner, web camera, MICR, OCR, OMR, bar-code reader, monitor, printer, plotter. Memory: Primary, secondary, auxiliary memory; RAM, ROM, cache memory, magnetic tape, magnetic disks, hard disk drives, optical disks, CD-R, DVD, flash drives, blue ray disc, Computer Organization and Architecture: C.P.U., registers, system bus, main memory unit, motherboard, ports and interfaces, expansion cards, ribbon cables, SMPS, memory chips.	
UNIT II	**Number system and Internet Basics**	(14)
	Number System and its different conversion: Decimal to Binary, Binary to Decimal, Decimal to Octal, Octal to Decimal, Decimal to Hexadecimal, Binary to Octal, Octal to Binary, Binary to Hexadecimal, Hexadecimal to Binary, Octal to Hexadecimal, Hexadecimal to Octal. **Internet Basics:** Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System. Web Basics: Introduction to web, web browsers, http/https, URL, HTML5, CSS	

Course Outcomes: - Students will be able to…
1. Apply Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
2. Analyze introduction of computers, classification of computers, and anatomy of computer.
3. Evaluate the constituents and architecture of computers and microcontrollers.
4. Explain Web Programming basics, introduction of HTML and CSS programming

Reference Books:
1. J. Glenn Brook shear, (2015),” Computer Science: An Overview”, Addison-Wesley, Twelfth Edition
2. David Rileyand Kenny Hunt (2014), Computational thinking for modern solver, Chapman & Hall/CRC
3. Pradeep K. Sinha and PritiSinha (2010), Computer Fundamentals (Sixth Edition), BPB Publication
4. R.G. Dromey, (2005), “How to solve it byComputer”, PHI.

Theory: Course II: BAIT105: Programming in C

Course Objectives: Students should be able to…

1. Understand working of hardware and software and the importance of operating systems
2. Identify programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
3. Study of the syntax and semantics of the C programming language.
4. Learn the usage of structured programming approaches in solving problems.

Credits=2	**SEMESTER-I** **Course II: BAIT105: Programming in C**	No. of hours per unit/ credits
Unit I:	**Introduction to C Programming**	(15)
	Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C, Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants, Formatted I/O functions - printf and scanf, control stings and escape sequences, output specifications with printf functions; Unformatted I/O functions to read and display single character and a string - getchar, putchar, gets and puts functions.	
	Operators and Control Structures Introduction to C Programming: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators, Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion, Decision making Statements - Simple if, if else, nested if else, else if ladder, Switch Case, goto, break & continue statements; Looping, Statements - Entry controlled and exit controlled statements, while, do-while, for loops, Nested loops	
Unit II:	**Arrays and functions**	(15)
	Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. Need for user applied functions; Format of C user applied functions; Components of user applied functions - return type, name, parameter list, function body, return statement and function call; Categories of user applied functions - With and without parameters and return type, Strings: Declaring & Initializing string variables; String handling functions -strlen, strcmp, strcpy and strcat; Character handling functions -toascii, toupper, tolower, isalpha, isnumeric etc.	
	Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using Pointers.	

Course Outcomes: - Students will be able to…
1. Perform input and output operations using programs in C
2. Create and Write programs that perform operations on arrays
3. Analyses, read, understand and trace the execution of programs written in C language
4. Decompose a problem into functions and to develop modular reusable code.

Reference Books:
1. P. K. Sinha & Priti Sinha 2022), Foundations of Computing(BPB)
2. Yashwant Kanetkar (2021), Let Us C: Authentic guide to C programming language (18th Edition)
3. V. Raja Raman (2019), Programming in C (PHI –EEE), 2nd edition, PHI Learning Private Limited.
4. S. Byron Gottfried (2018) Programming with C (TMH), 4th edition.
5. E. Balaguruswamy (2017), Programming in ANSI C (TMH),7th Edition McGraw Hill
6. Kamthane (2008), Programming with ANSI and TURBO C ,3rd edition, (Pearson Education)

Practical-I
Lab Course I: BAIP106: Lab based on (BAIT104andBAIT105)

Course Objectives: Students should be able to…

1. Study of awareness of fundamental understanding of various applications of AI techniques
2. Identify programming skills in core Python.
3. Learn an IDE to create, edit, compile, run and debug programs
4. Understand the various steps in program development.

Credits=2	SEMESTER-I LabCourseI-BAIP106: Lab based on (BAIT104andBAIT105)	No.of. hours Per unit/credits (60)
Part A:	**Fundamentals of Computer**	
	1. Identification of the peripherals of a computer, componentsin a CPU and their functions. 2. Assembling and disassembling the system hardware components of personal computer. 3. Basic Computer Hardware Trouble shooting. 4. Study of internet basics 5. Study of Algorithm and Flowcharts. 6. Study of Internet Browsers, Integrated Development Environment (IDE) with Examples. 7. Verify the components of a typical computer system. 8. Study of number systems. 9. Study of HTML tags 10. Study of table tags, ordered and unordered lists.	
Part B:	**Programming in C**	
	11. Program to read radius of a circle and to find area and circumference. 12. Program to read three numbers and find the biggest of three 13. Program to read a number, find the sum of the digits, reversethe number and check it for palindrome 14. Program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder) 15. Program to find the roots of quadratic equation (demonstration of switch Case statement) 16. Program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array) 17. Program to demonstrate string functions. 18. Program to demonstrate pointers in C 19. Program to demonstrate call by value using function. 20. Program to demonstrate call by reference using function.	

Course Outcomes: -Students will able to…
1. Evaluate introduction of computers, classification of computers, and anatomy of computer.
2. Explain Study of constituents and architecture, microcontrollers.
3. Translate given algorithms to a working and correct program and correct syntax errors as Reported by the compilers
4. Demonstrate and correct logical errors encountered during execution and represent and Manipulate data with arrays, strings and structures

Reference Books:

1. Pradeep K. Sinha and Priti Sinha (2010), Computer Fundamentals (Sixth Edition), BPB Publication
2. M. Venkataraman, N. Sridharan and Chandrasekaran (2009), Discrete Mathematics, the National Publishing Company.
3. R.G. Dromey, (2005), "How to solve it by Computer", PHI.
4. Yashwant Kanetkar (2021), Let Us C: Authentic guide to C programming language (18th Edition)
5. Stuart Russell, peter Norvig (2020), Artificial Intelligence: A Modern Approach, 4th Edition, University of California at Berkeley, Pearson education.
6. V. Rajaraman (2019), Programming in C (PHI – EEE), 2nd edition, PHI Learning Private Limited.

B.Sc. I-Semester-I
Theory: CourseI-BAIT105: Computational Statistics-I

Course Objectives: The main objectives of this course are:

1. methods in descriptive statistics
2. the use of concepts in descriptive statistics as applied to real data
3. methods for finding correlation between variables
4. Fitting an equation for prediction and apply the same for real data.

Credits=2	SEMESTER-I Course I-BAIT105: Computational Statistics-I	No. of hours per unit/ credits
UNIT I	**Data condensation and Graphical methods –**	(7)
	Raw data, attributes and variables, discrete and continuous variables. Primary data, Secondary data, Qualitative data, Quantitative data, Presentation of data using frequency distribution and cumulative frequency distribution. (Construction of frequency is not expected) Graphical Presentation of frequency distribution – histogram, stem and leaf chart, less than and more than type ogive curves. Methods of Sampling: SRS, SRSWOR, Stratified random sampling. Numerical problems related to real life situations. **Measures of Central tendency -** Measures of Central tendency: Mean, Mode, Median. Examples where each one of these is most appropriate. Partition values: Quartiles, Box-Plot. **Measures of Dispersion**: Range, Coefficient of range, Quartile deviation, Coefficient of quartile deviation, Variance, Standard Deviation, Coefficient of Variation. (For raw data, ungrouped frequency distribution and exclusive type grouped frequency distribution).	
UNIT II	**Moments, Skewness, Kurtosis and Analysis of Bivariate data:**	(8)
	Moments Raw and Central moments: definition, computations for ungrouped and grouped data (only up to first four moments). Relation between raw and central moments up to Fourth order. Numerical problems related to real life situations. **Skewness, Kurtosis and its measures.** Concept of symmetric frequency distribution, skewness, positive and negative skewness. Measures of skewness-Pearson's measure, Bowley's measure, β_1, γ_1. **Correlation and Linear Regression (for bivariate raw data)** Bivariate data, Scatter diagram. Correlation, Positive Correlation, Negative Correlation, Zero Correlation. Karl Pearson's coefficient of correlation (r), limits of r ($-1 \le r \le 1$), interpretation of r, Coefficient of determination (R^2), Auto-correlation coefficient up to lag 2. Meaning of regression. Fitting of line $y = a+bx$ using least square method. Concept of residual plot and mean residual sum of squares. Numerical Problems	

Course Outcomes: Students will be able to…

1. Evaluate the graph and types of graphs, representation of graphs.
2. Students are understanding how to summarized data and find averages as well as spread of the data from central value (average).
3. Students get the knowledge about to compute moments and find out symmetry and Skew symmetry of data.
4. Understanding Bivariate data

Reference Books:

1. Fundamentals of Statistics by Goon, Gupta, Das Gupta.
2. Statistical Methods by S. P. Gupta.
3. P.S. Grewal (1990), Methods of Statistical Analysis (Sterling Publishers).
4. Business Statistics by S. Saha.

B.Sc. I -Semester-I
Theory: CourseII-BAIT106: Computational Statistics-II

Course Objectives: - The main objectives of this course are:
1. To understand the basic concepts of probability and its applications.
2. To understand the concepts of random variables, univariate probability distributions.
3. To find, interpret the conditional probabilities of various events

Credits=2	SEMESTER-I Course II-BAIT106: Computational Statistics-II	No. of hours per unit/ credits
UNIT I	**Basic Theory of Probability**	(15)
	Counting Principles, Permutations and Combinations, Deterministic and non-deterministic models. Random Experiment, Sample Spaces (finite and countably infinite) Events: types of events, Operations on events. Probability - classical definition, probability models, axioms of probability, probability of an event. Theorems of probability (with proof) i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(A) \leq P(B)$ when $A \subset B$ iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ Numerical problems related to real life situations. **Basic Notion of Probability Theory:** Concepts and definitions of conditional probability, multiplication theorem $P(A \cap B) = P(A). P(B\|A)$ Bayes' theorem (without proof) Concept of Posterior probability, problems on posterior probability. Definition of sensitivity of a procedure, specificity of a procedure. Application of Bayes' theorem to design a procedure for false positive and false negative. Concept and definition of independence of two events. Numerical problems related to real life situations.	
UNIT II	**Discrete Random variable:**	(15)
	Definition of a random variable and discrete random variable. Definition of probability mass function, distribution function and its properties. Definition of expectation and variance, theorem on expectation. Numerical problems related to real life situations. **Standard Discrete Distributions:** Discrete Uniform Distribution: definition, mean, variance. Bernoulli Distribution: definition, mean, variance, additive property. Binomial Distribution: definition, mean, variance, additive property. Geometric Distribution (p. m. f $p(x) = pq^x$, $x = 0, 1, 2.$): Definition, mean, variance. Poisson Distribution: definition, mean, variance, mode, additive property, limiting case of B (n, p) Illustration of real-life situations. Numerical problems related to real life situations	

Course Outcomes:

1. Students must get knowledge about the how to use probability distribution to evaluate examples.

2. Students are understanding how calculate conditional probabilities of various events

3. Students get the knowledge about various distributions.

4. Students are become to find the probabilities of events and conditional probabilities.

Reference Books:

1. Introduction to Probability theory and Mathematical Statistics by V. K. Rohatgi

2. Fundamental of Statistics by S. C. Gupta.

3. Probability and statistics with reliability queuing and computer science applications by K. S. Trivedi

4. Descriptive Statistics, Probability and Probability Distributions – I: By Prof P. G. Dixit

B.Sc. I -Semester-I
Practical-I
Lab Course I: BAIP24-109: Lab based on (BAIT107 and BAIT108)

Course Objectives: The main objectives of this course are:

1. To represent statistical data.

2. To compute various measures of central tendency, dispersion, moments, Skewness and kurtosis.

3. To compute probability of various events.

4. To compute correlation coefficient for bivariate data and interpret it.

5. Predict value of dependent variable with the help of independent variable.

6. To know application of some standard discrete probability distributions.

Credits=2	SEMESTER-I Lab Course I: BAIP24-109: Lab based on (BAIT107 and BAIT108)	No.of. hours Per unit/credits (60)
	1. Diagrammatic & Graphical representation of the frequency distribution 2. Measures of Central Tendency 3. Measures of Dispersion 4. Moments, Skewness and Kurtosis 5. Correlation coefficient 6. Regression 7. Applications of Probability 8. Applications on Bayes' theorem. 9. Applications on Independence Probability 10. Applications of Binomial, Geometric and Poisson Distributions.	

Learning Outcomes:

1) Students are able to find the coefficient of correlation between two and more variables.

2) Students are able to predict value of one variable when other is known by using technique of regression analysis.

3) Students are able to draw diagram and graphs based on frequency distribution

4) Students are understanding how to summarized data and find averages as well as spread of the data from central value (average).

5) Students get the knowledge about to compute moments and find out symmetry and skew symmetry of data.

6) Students must get knowledge about the how to use probability distribution to evaluate examples.

Notes:
i) Students must complete the entire practical to the satisfaction of the concerned teacher.
ii) Students must produce laboratory journal along with completion certificate signed by Head of the Department at the time of practical examination.

Laboratory Requirement:
 Laboratory should be well equipped with sufficient number of scientific calculators and computers along with necessary software's, UPS, and printers.

B.Sc. I-Semester-I

Theory: CourseI-BAIT110: Principles and Functions of Management

Course Objectives: -The main objectives of this course are:

1. To acquaint with the basic principles and functions of business and professional management.

2. To. Acquaint with the basic concept and functions of professional management.

3. To develop the Planning and Decision-making skills and abilities

4. To develop the Communication and Controlling skills and abilities

Credits=2	SEMESTER-I CourseI-BAIT110: Principles and Functions of Management	No.of. hours per unit/c redits
UNITI	**Introduction to Management & Professional Management**	(15)
	1.1 Management-	
	1.1.1 Meaning, Definition, Characteristics	
	1.1.2 Functions	
	1.1.3 Functional Areas.	
	1.1.4 Importance Management	
	1.1.5 14th principals of Management by Henry Fayol's	
	1.2 Professional Management	
	1.2.1 Meaning, Definition, Characteristics.	
	1.2.2 Need of Professional Management.	
UNITII	**Planning and Decision Making**	(15)
	2.1.1 Planning- Meaning,	
	2.1.1 Definition features.	
	2.1.2 Importance	
	2.1.3 Types of Planning	
	2.1.4 Steps in planning process	
	2.1.5 Limitations of planning	
	2.2 Decision Making-	
	2.2.1 Meaning and Definition	
	2.2.3 Importance Decision making	
	2.2.4 Techniques of decision making (Qualitative and Quantitative)	
	2.3 Communication and Controlling:	

	2.3.1 Communication	
	2.3.2 Concept, Process and Types of Communication	
	2.3.3 Barriers in Communication and overcoming barriers in communication.	
	2.4 Controlling-	
	2.4.1 Concept and Process of Controlling.	
	2.4.2 Techniques of Controlling –Traditional and Modern	

Course Outcomes:

1) Students must get knowledge about the how to use probability distribution to evaluate examples.

2) Students are understanding how calculate conditional probabilities of various events

3) Students get the knowledge about various distributions.

4) Students are become to find the probabilities of events and conditional probabilities.

Reference Books:

1. R. N. Singh, Management Thoughts AND Thinkers- Sultan Chand and Sons, 2nd edition.

2. S.M. Kolte, 2011, Business Management, Pimplapure Book Distributors, 1st edition.

3. Samual C. Centro and S. Travis Centro, 2008, Modern Management, Pearson Education, 2nd edition.

4. Management, stoner, Freeman and Gilbret, person publications 6th edition page 293 to 299

5. Management and Organizational Behavior, P. Subbarao, Himalaya publishing House

B.Sc. I-Semester-I
Indian Knowledge System
(IKS)
IKS111: History of Computers in India

Course Objectives: Student should be able to…
1. Understand design for a steam-powered, mechanical computer.
2. Learn digital computing replaced analog methods.
3. Study the evolution of Indian programming languages
4. Identify the story behind the modern computing

Credits=2	SEMESTER-I History of Computers in India	No. of hours per unit/ credits
Unit I	**Pre-Independence Era of Computers**	(14)
	Introduction: Computing in the Pre-industrial World, Establishment of the Tata Institute of Fundamental Research, Analog Computing in the 19th and early 20th, Introduction of Electronic computers in India, InformationTechnologybefore1945 **Early Computing Initiatives:** Development of the first indigenous electronic computer: HEC-2M, Role of F.C. Kohli in setting up the first computer Manufacturing company in India, Computers and Culture in the1960s, Early Computer Languages and Software	
Unit II	**Era of Mainframes and Minicomputers**	(16)
	Introduction of mainframe and minicomputer technologies in India, Role of the Department of Electronics (DoE) in promoting computerization, Evolution of Indian programming languages (FORTRAN, COBOL) **Modern Computing:** Emergence of Indian IT companies and software exports, Role of NRIs in the growth of the Indian IT industry, Internet and Digital Revolution, Mobile computing and smart phone revolution in India, Artificial Intelligence (AI) and Machine Learning (ML) in Indian industries	

Course Outcomes:-Student will be able to…
1) Design for a steam-powered, mechanical computer.
2) Evaluate digital computing replaced analog methods.
3) Gain the knowledge about evolution of Indian programming languages.
4) Elaborate the story behind the modern computing.

Reference Books:
1. Martin Campbell-Kelly and William as pray (2004), Computer: A History of the Information Machine
2. Fred Turner (2006), Counter culture to Cyber culture (University of Chicago Press)
3. Martin Campbell-Kelly (2003), Airline Reservations to Sonic the Hedgehog: A History of the Software Industry (MIT Press)
4. Janet Abbate (1999), Inventing the Internet, (MIT Press)

Structure and Title of Courses of B.Sc. Course:

B.Sc. I Semester II

Course Number	Course Code	Course Name
Subject-I DSCIII:	BAIT24-201	Artificial Intelligence-II
Subject-I DSCIV	BAIT24-202	Object Oriented Programming in python
Subject-I Practical-II	BAIP24-203	Practical based on DSC III and DSC IV
Subject-II DSCIII:	BAIT24-204	Operating System
Subject-II DSCIV	BAIT24-205	Web Technologies
Subject-II Practical-II	BAIP24-206	Practical based on DSC IV Lab
Subject-III DSCIII:	BAIT24-207	Foundational Mathematics for AI
Subject-III DSCIV	BAIT24-208	Linear Algebra
Subject-III Practical-II	BAIP24-209	Practical based on DSC III and DSC IV

B.Sc. I-Semester II
Theory: Course-I: BAIT201: Artificial Intelligence-II

Course Objectives: Students should be able to…

1. To learn various concepts of AI Techniques.

2. To learn various Search Algorithm in AI.

3. To learn probabilistic reasoning and models in AI.

4. To learn about Markov Decision Process.

5. To learn various type of Reinforcement learning.

Credits=2	**SEMESTER-II** **Course-I: BAIT201: Artificial Intelligence-II**	**No. of. hours Per unit/ credits**
Unit-I	**Searching Algorithms**	(16)
	Problem Characteristics, searching for solutions, uniformed search strategies – Breadth first search, depth first Search, Hill climbing, Search with partial information (Heuristic search) Best first search, A*, AO* Algorithms, Constraint satisfaction Problem, means-end analysis. Introduction to game playing, Adversial search, Game search, Radom search. **Reinforcement Learning with Reasoning:** Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning. Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	
Unit-II	**Software Agents**	(14)
	Software Agents Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems. **AI applications and Prolog programming:** Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception – Planning – Moving Prolog Programming: Introduction to Prolog: Syntax and Numeric Function, Basic List Manipulation Functions in Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays	

Course Outcomes: Students will be able to…

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundation

2. Evaluate basic principles of AI in solutions that require
Problem solving, inference, perception, knowledge representation, and learning.

3. Apply the structure and components of a Python program.

4. Analyses to write loops and decision statements in Python.

Reference Books:
1.   S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2009.
2.   Artificial Intelligence: A Modern Approach, 4th Edition, Stuart Russell, Peter Norvig University of California at Berkeley, Pearson education, 2020.
3.   I. Bratko, ―Prolog: Programming for Artificial Intelligence, Fourth Edition,
    4. Trivedi, M.C., "A Classical Approach to Artificial Intelligence", Khanna
       Publishing House, Delhi.

    5. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011

Textbook:
1. David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010

2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall.

3. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill

4. Carl Townsend, "Introduction to Prolog Programming"
5. Ivan Bratko, "PROLOG Programming for Artificial Intelligence", Addison-Wesley, 2nd Edition.

Web Resources:
https://github.com/dair-ai/ML-Course-Notes

https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html

https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghL
MZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

Theory: Course II: BAIT202: Object Oriented Programming using python

Course Objectives: Students should be able to…

1. Learn fundamental concepts of objects.
2. Study of principles of programming.
3. Understand the concept of object-oriented programming like classes, constructors, polymorphism, inheritance, and file handling.
4. Identify the open-source libraries.

Credits=2	SEMESTER-II Course II: BAIT202: Object Oriented Programming using python	No. of. hours per unit/credits
UNIT I	**Introduction to Object Oriented Programming**	(16)
	Features of Object-oriented programming system (OOPS) – Classes and Objects, Encapsulation, Abstraction, Inheritance, Polymorphism, Classes and Objects: Creating a class, The Self variable, Constructor, Types of Variables, Namespaces, Types of Methods, Inheritance and Polymorphism– Constructors in inheritance, the super () method, types of inheritance, polymorphism, abstract classes and interfaces **Strings, functions and Python libraries:** Strings: Creating strings and basic operations on strings, string-testing Methods. Functions: Defining a function, calling a function, returning multiple values from a function, functions are first class objects, formal and actual arguments, positional arguments, recursive functions, Basics of open-source libraries for data prepressing, modelling and visualization, Using Python to Access Web Data Regular Expressions. Extracting Data, Sockets, Using the Developer Console to Explore HTTP, Retrieving Web Page, Parsing Web Pages Module	
UNIT II	**Exception Handling**	(14)
	Exception: Errors in a Python program, exceptions, exception handling, types of exceptions, the except block, the assert statement, User- applies exceptions. **Graphical User Interface and databases:** GUI in Python: The root window, fonts and colors, working with containers, Canvas, Frames, Widgets – Button widget, Label widget, message widget, text widget, radio button widget, entry widget, Using Databases, Single Table CRUD, Designing and Representing a Data Model, Inserting Relational Data, Reconstructing Data with JOIN, Many to Many Relationships.	

Course Outcomes: -Students will be able to…

      1. Evaluate the basic concepts of OOPs.

      2. Apply different Python library to solve programming problems.

      3. Explain the advanced concepts of python and apply for accessing data bases and web data.

      4. Analyze APIs and third-party libraries to be used with Python.

Reference Books:

1. Robert Sedgewick, Kevin Wayne, Robert Dondero (2016), "Introduction to Programming in Python: An Inter-Disciplinary Approach", Pearson India Education Services pvt. Ltd.,
2. Timothy A. Budd, (2015)," Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,
3. Charles Dierbach, (2013) "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition
4. Kenneth A. Lambert, (2012), "Fundamentals of Python: First Programs", CENGAGE Learning.
5. Michael H. Goldwasser, David Letscher, (2007), "Object Oriented Programming in Python", Prentice Hall,1stEdition

B.Sc. I-Semester-II
Lab Course-I: BAIP203: Lab based on (BAIT201andBAIT202)

Course Objectives: Students should be able to…
1. Learn principles of programming.
2. Understand the concept of object-oriented programming like classes, constructors,Polymorphism, inheritance, and file handling.
3. Study basic principles of AI toward problem solving, inference, perception,knowledge representation, and learning.
3. Identify to design and program Python applications.
4. Learn to use lists, tuples, and dictionaries in Python programs.

Credits=2	SEMESTER-II Lab Course I- BAIP203: Lab based on (BAIT201and BAIT202)	No.of. hours Per unit/cre dits (60)
Part A:	**Object Oriented Programming using python**	

	1. Write a NumPy program to compute the cross product oft to given vectors
	2. Write a NumPy program to calculate the QR decomposition of a given matrix
	3. Write a Pandas program to convert a Panda Module Series to Python list and its type.
	4. Write a Pandas program to convert a NumPyarray to a Pandas series
	5. Implement the concept of Classes and objects
	6. Implement the concept of inheritance
	7. Implement the concept of polymorphism
	8. Write a menu-driven program tocreate mathematical 3D objects
	   I. curve
	   II. sphere
	   III. cone
	   IV. arrow
	   V. ring
	   VI. Cylinder.
	9. Write a program to read n integers anddisplay the histogram.
	10. Write a program to plot a graph of people with pulse rate pass Heigh. The values of Pand H are to be entered bythe user.	

Part B:	**Artificial Intelligence-II**	
	11. Program to the hill climbing search algorithm isa local search algorithm used for Optimization problems. 12. Write a Prolog program to implement the family tree and demonstrate the family relationship. 13. Write Prolog implement A* algorithm. program 14. Write Prolog program to implement Minmax search	

	15. Write Prolog program to solve water jug problem	
	16. Write Prolog program to implement Tic-tac-toe.	
	17. Write Prolog program to implement alpha-beta pruning	
	18. Write Prolog program to solve 4 Queen Problem.	
	19. Write Prolog implement Best first search algorithmprogram	
	20. Write a Prolog program to implement conc (L1, L2, L3) where L2 is the list to be appended with L1 toget the resulted list L3.	

Course Outcomes: -Students will be able to…
1. Explain basic principles of Python programming language
2. Implement database and GUI applications.

3. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its

   Foundations.
4. Evaluate basic principles of AI in solutions that require problem solving, inference, perception,
   Knowledge representation and learning.

Reference Books:
1. Robert Sedgewick, Kevin Wayne, Robert Dondero, (2016), "Introduction to Programming in Python: An Inter-Disciplinary Approach", Pearson India Education Services Pvt. Ltd.,
2. Timothy A. Budd (2015)," Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,
3. Charles Dierbach, (2013), "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition
4. Kenneth A. Lambert (2012), "Fundamentals of Python: First Programs", CENGAGE Learning.
5. David L. Pooleand Alan K. Mackworth, (2010), Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press.

B.Sc. I-Semester-II
Theory: Course I: BAIT204: Operating Systems

Course Objectives: -Students should be able to…

1. Aware different types of Operating System and their services.
2. Learn different process Scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
3. Understand virtual memory concepts.
4. Remember the concept of secondary memory management.

Credits=2	SEMESTER-II Course I: BAIT 204: Operating Systems	No.of. hours per unit/credits
UNIT-I	**Concepts of Operating Systems**	(14)
	Computer system overview, concept of an operating system, batch system, multiprogramming, multiprocessing, multi user, time sharing, personal system, parallel system, real time system, simple monitors, general system architecture, System components, operating system services, system calls, system programs, system structure, Approaches to OS design and implementation: Microkernel, Layered, Kernel Approach **Processes and Threads:** Concept of process, process states, process state transitions, process control block, operations on processes, threads, concurrent processes, Mutual exclusion and synchronization, principles of deadlocks, integrated deadlocks strategy, scheduling levels, scheduling criteria, Inter process synchronization, Inter process communication, Linux, IPC Mechanism, Remote procedure calls, RPC exception handling, security issues	
UNIT-II	**Memory Management and Data Management**	(16)
	Logical and physical address space, storage allocation and management techniques, swapping concepts of multi programming, paging, segmentation, virtual storage management strategies, demand paging, page replacement algorithm, thrashing, File organization, record blocking, access method, directory structure, protection file system structure, allocation methods, free space management ,directory implementation, disk structure, disk scheduling, disk management, buffering, swap space management, RAID levels **Case Studies and OS Abstractions:** Linux/Unix OS design and architecture, Unix shell, Unix operating system services, user perspective, representation of files in Unix system processes and their structure, input-output system, memory management in Unix, Processes: fork, wait, exec, exit, kill, getpid, brk, nice, sleep, trace, Files: open, close, read, write, lseek, stat, sync, Directories: mkdir, rmdir, link, unlink, mount, umount users +, Security: chown, chmod, getuid, setuid, Inter process communication: signals, pipe, Networking: socket, accept, snd, recv, connect	

Course Outcomes: -Students will able to…
1. Control access to a computer and the files that may be shared
2. Demonstrate the knowledge of the components of computer and their respective roles in computing.
3. Recognize and resolve user problems with standard operating environments.
4. Apply practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

Reference Books:
1. Ekta Walia (2020), Operating System Concepts, Khanna Book Publishing.
2. Crowley (2017), Operating System A Design Approach-, Mc Graw Hill Education.
3. Kernighan and Pike (2015), UNIX programming environment, PHI/Pearson Education
4. Andrew S. Tanenbaum (2014), Modern Operating Systems,2nd edition, Pearson/PHI
5. William Stallings (2012), Operating systems Internals and design principles, Pearson Education,
6. Abraham Silberchatz, Peter B. Galvin, Greg Gagne (2006) Operating System Principles- 7th Edition, John Wiley Publication
7. W. Stallings (2005), Operating System Internals and Design Principles, Fifth Edition, Pearson Education/ PHI
8. W.R. Stevens (2000), Advanced programming in the UNIX environment, Pearson education.

B.Sc. I-Semester-II

Theory: Course II: BAIT205: Web Technologies

Course Objectives: - To understand the fundamentals of HTML.

1. To gain proficiency in Cascading Style Sheets to control the presentation and layout of HTML elements and create visually appealing web pages.

2. To develop a strong foundation in JavaScript programming to enable the creation of interactive and dynamic web content

3. To learn advanced techniques in DHTML using JavaScript.

4. Explore the principles and applications of XML for defining and structuring data in web applications.

Credits=2	SEMESTER-II Course I BAIT205: Web Technologies	No.of. hours per unit/ credits
UNIT-I	**Introduction to HTML**	(14)
	HTML: Basic HTML- Document Body- Text- Hyperlinks- Adding More Formatting- Lists- Tables using Images. More HTML: Multimedia Objects- Frames- Forms Towards Interactive- HTML Document Heading. **CSS and Introduction to JavaScript:** Cascading Style Sheets: Introduction- Using Styles- Simple Examples- Your Own Styles- Properties and Values in Styles- Style Sheet- Formatting Blocks of Information- Layers. Introduction To Java script: What Is DHTML, JavaScript- Basics, Variables- String Manipulations Mathematical Functions- Statements- Operators- Arrays- Functions. Objects In JavaScript: Data and Objects in JavaScript- Regular Expressions- Exception Handling.	
UNIT-II	**DHTML**	(16)
	DHTML with JavaScript: Data Validation, Opening A New Window, Messages and Confirmations, The Status Bar- Different Frames, Rollover Buttons, Moving Images. **XML:** XML: Defining Data for Web Applications- Basic XML- Document Type Definition- Presenting XML Document Object Model. Web Service	

Course Outcomes: -Students will able to…

1. Remember basic HTML elements and attributes for structuring web documents.
2. Comprehend the principles of Cascading Style Sheets (CSS) and their application in styling web content.
3. Demonstrate the ability to utilize JavaScript to create interactive web pages.
4. Analyze the effectiveness of DHTML techniques in enhancing user experience, such as data validation and dynamic content generation.
5. Design and implement XML document

Reference Books:

6. Harvey M. Deitel and Paul J. Deitel- "Internet & World Wide Web How to Program," Pearson Education,
   5th Edition, 2018.
7. Laura Lemay, Rafe Colburn, "Mastering HTML, CSS & JavaScript Web Publishing", BPB Publications,
   1 st Edition, 2016.
8. Uttam K. Roy, "Web Technologies," Oxford University Press, 2010.
9. Godbole, Khate, "Web Technologies," McGraw Hill, 3rd Edition 2017.

B.Sc. I-Semester-II
Lab Course I: BAIP206: Lab based on BAIT205

Course Objectives: Students should be able to…

1. To Create Web Pages, Web sites.
2. To perform JavaScript, CSS, and Style sheets.
3. To understand the fundamentals of HTML, CSS and Java script.

Credits=2	SEMESTER-II Lab Course- I: BAIP24-206: Lab based on (BAIT205)	No. of. hours Per unit/ credits (60)
	1. Program based on singular and paired tags, formatting tags, list tags. 2. Program based on marquee, hyperlink, and image maps. 3. Program based on frame tags. 4. Program based on CSS to create Calculator. 5. Programs based on creating forms, inputting values. 6. Program based on creation of simple web form by using HTML, CSS and JS. 7. Program based on creation of simple web form by using HTML, CSS and JS. 8. Program based on creation of simple web form by using HTML, CSS and JS. 9. Program based on creating action performing buttons by using HTML, CSS and JS. 10. Program based on control statement 11. Program based on event handling and built in function. 12. Program based on validation 13. Program based on phone number validation. 14. Program to Create a Blurry Background Image. 15. Create a Single Page Application using HTML CSS & JavaScript.	

Course Outcomes: On completion of this course, students will be able to:
1. Write, debug and execute programs using Web technologies, create web pages.
Operating Environment:
2. For 'Web' Technologies: Operating system: Linux Editor: Any Linux based editor like Notepad, etc.

B.Sc. I Semester-II

Theory: Course-I: BAIT207: Foundational Mathematics for AI

Course Objectives: Students should be able to…

1. Use the properties of set operations algebraically.
2. Introduce the fundamental of logic, relations and counting
3. Learn to impart adequate knowledge on the need of mathematics.
4. Understand the need of problem-solving techniques.

Credits=2	SEMESTER- II Course-I: BAIT207: Foundational Mathematics for AI	No. of. hours per unit/ credits
UNIT-I	**Relation, Counting Principle and Logic**	(15)
	Relation and Counting Principle Set: Definition and types of set, Functions and types of function Relations and types of relation, Counting: Addition &Multiplication principle, Permutation And Combination, Cardinality of finite set, Cardinality of union of sets (Addition principle), Principle of inclusion & exclusion, examples **Logic** Statement and types of statements, truth value, Logical connectives and Construction of truth table, Statement pattern: Tautology, contingency and Contradiction, Logical equivalence, laws of logic with examples.	
UNIT-II	**Calculus and Graph theory**	(15)
	Calculus Limit and Continuity of function, L'Hospital's rule, Differentiability: Derivative of a function by first principle and examples, Derivative rules: Chain rule, Product rule, Quotient rule and examples, Integration of a function: Basic Rules and examples, Fundamental theorem of calculus **Graph theory** Definition and elementary results, Types of graphs, Matrix representation of graphs: Adjacency matrix and Incidence matrix, Sub graphs, induced graphs, union and intersection of graphs, Complement of a graph, Self-complementary graphs, and Tree graphs: Definition and examples.	

Course Outcomes:

After completion of this course, the students will be able to:

1. To understand the concept of relation, function and to apply basic counting techniques
2. To understand the concept of limit, derivative and integration.
3. To apply formal or informal logic proofs and logical reasoning to real problems
4. To apply principles and concept of graph theory in practical situations

Reference Books: -

1. Discrete mathematics -D.M. Pandhare and M. D. Bhagat by Nirali Prakashan.
2. Discrete mathematics by S. R. Patil and others, Nirali Publications.
3. A Text book of Algebra and Calculus by S. R. Patil and Others Nirali Prakashan.
4. Calculus by Dr. S.B. Nimse

B. Sc.-I Semester- II

Theory: Course-II: BAIT208: Linear Algebra

Course Objectives: Students should be able to…
1) Solving system of linear equations.
2) Finding Eigen values and Eigen vectors.
3) Understanding the concept of vector space.
4) Understanding the concept of linear transformation.

Credits=2	SEMESTER-II Course II: BAIT208: Linear Algebra	No.of. hours per unit/credits
UNIT I	**Matrices and System of Linear Equations**	(15)
	Matrices and System of Linear Equations Matrices, Types of matrices, Algebra of matrices, Matrix Transformation, inverse of matrix, Rank of matrix, System of Linear equations, Results on system of linear equations (Statements Only), Solutions of System of Linear Equations: Gauss Elimination Method, Gauss Jordan method and examples **Eigen values and Eigen vectors** Eigen values and Eigen Vectors of matrix: Definition and examples, Cayley -Hamiltonian theorem (Statement only) and examples, Diagonalization: Definition and examples	
UNIT II	**Vector Space and Linear transformation**	(15)
	Vector Space Vector Space: Definition and examples, Basic properties of vector space, Sub Space: Definition and examples, Linear Dependence and Independence, Linear combination and spanning, Basis and Dimension, General inner product space: Definition and examples **Linear transformation** Linear transformation: Definitions and examples, The Kernel and Range of a linear transformation, examples The Matrix of a Linear Transformation and examples.	

Course Outcomes:

After completion of this course students will be able to:
1. To understand the concept of matrices and solution of system of linear equations.
2. To understand the concept of vector space.
3. To understand the concept of Eigen values and Eigen vectors.
4. To understand the concept of linear transformations.

Reference Books:
1) A textbook of Linear Algebra, Nirali Prakashan
2) A textbook of Linear Algebra, Vision Publication.
3) Elementary Linear Algebra with Applications, Howard Anton, Chris Rorres, John Wiley and sons. 7th Edition (1994).
4) Linear Algebra Linear Algebra with applications, Howard Anton, Chris Rorres

B.Sc. I-Semester-II
Lab Course I: BAIP24-209: Lab based on BAIT207 and BAIT208

Course Objectives: Students should be able to…
1. To understand the applications of mathematical concepts.
2. Learn to impart adequate knowledge on the need of mathematics.
3. Understand the need of problem-solving techniques.
4. Develop problem skills using calculus techniques.

Credits=2	SEMESTER-II Lab Course-I: BAIP24-209: Lab based on BAIT207 and BAIT208	No.of. hours per unit/ credits (60)
	1. Permutation and Combination with examples 2. Principle of inclusion & exclusion and examples 3. L'Hospital's rule 4. Derivative and integration with examples 5. Logical equivalence with examples 6. Operations on graph 7. Gaussian Elimination Method. 8. Gauss Jordan Method. 9. Eigen values and Eigen vectors of a matrix 10. Cayley-Hamiltonian theorem and Examples	

Course Outcomes:

After completion of this course students will be able to:
1. Find solution of real-life problem with the help of permutation and combination.
2. To compute limits, derivatives and integration of algebraic, trigonometric, Logarithmic and exponential functions.
3. Understand the logical equivalence between various statement forms.
4. Take various operations on graph.
5. Find the solution of System of Linear Equations
6. Find the Eigen values and Eigen vectors of a matrix.
7. Understand the use of Cayley-Hamiltonian theorem and solving examples.

B. Sc.-I Semester- II
Theory: Course-II: BAIT210: Managerial Skills

Course Objectives: Students should be able to…

1. To acquaint with the basic Management Skill.
2. To develop the managerial skills and abilities for the fulfillment of managerial tasks.
3. To adopt managerial skills for the effective and efficient performance of the working tasks.
4. To demonstrate how to develop management skills.

Credits=2	SEMESTER-II Course II: BAIT210: Managerial Skills	No. of. hours per unit/cre dits
UNIT-I	**Managerial Skills**	(15)
	1.1 Meaning and Definitions of Managerial Skills, Essential management skills **1.2** Types of Managerial Skills – (Technical skills, Conceptual skills, Interpersonal skills, communication skills, Time management, Event Management, Problem solving, Good Listening, developing a culture Training, Negotiation, Collaboration, Looking to the Future) **1.3** Skills of different level of Management, **1.4** Skills of International Managers	
UNIT-II	**Managerial skills & personal skills for Managers**	(15)
	2.1 Different methods of improving management skills- An approach to skill development leadership & Management, Decision Making. **2.2.** Personal Skills (Skill Learning) Developing Self-Awareness, Managing personal stress, Solving Problem Analytically and Creatively **2.3.** Presentation Skill	

Course Outcomes:

1. Students must get knowledge about the how to use probability distribution to evaluate examples.

2. Students are understanding how calculate conditional probabilities of various events

3. Students get the knowledge about various distributions.

4. Students are become to find the probabilities of events and conditional probabilities.

Reference Books:

1. R. N. Singh, Management Thoughts AND Thinkers- Sultan Chand and Sons, 2nd edition.

2. S.M. Kolte, 2011, Business Management, Pimplapure Book Distributors, 1st edition.

3. Samuel C. Centro and S. Travis Centro, 2008, Modern Management, Pearson Education, 2nd edition.

4. Management, stoner, Freeman and Gilbret, person publications 6th edition page 293 to 299

5. Management and Organizational Behavior, P. Subbarao, Himalaya publishing House