Mahatma Education Society's

Pillai College of Arts, Commerce & Science (Autonomous)

Affiliated to University of Mumbai

'NAAC Accredited 'A' grade (3 cycles)'
'Best College Award' by University of Mumbai
ISO 9001:2015 Certified

SYLLABUS

Program: Bachelors of Science (B. Sc.) in Information Technology

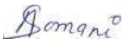
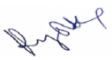
F.Y.B.Sc.Information Technology

PCACS/BSCIT/SYL/2024-25/FY

As per National Education Policy
Choice Based Credit & Grading System
Academic Year 2024-25

Board of Studies in the Department of Information Technology

Sr. No.	Name of the	Details	Sign
1	Prof. Deepika Sharma	Chairperson (Head of Department of Information Technology & Computer Science), Vice Principal	
2	Dr. Gajanan Wader	Principal	
3	Mrs.Munawira Kotyad Founder and CEO Wonderwheel Enterprises, Pillai, Director Pillai Center for Innovation & Research	Faculty Specialization	Absent
4	Dr. Amiya Kumar Tripathy Director Center for GeoAI & ML, Professor, Computer Engineering, Don Bosco Institute of Technology, Mumbai	Subject Expert From Outside Parent University	
5	Dr.Mrs. Anjali Kulkarni CKT College, New Panvel	Vice Chancellor Nominee, University of Mumbai	
6	Mr. Tito Idicula, Director, Programming Hub	Alumni representative	
7	Mr. Anant Baddi, Security Solution Architect, cloud Google Google	Industry Representative (Industry/Corporate/Allied Sector)	Absent

8	Mr. Bhupendra Kesariya Professor,N. M. .College, Vile Parle	Subject Expert in Mathematics From Outside Parent University	
9	Mrs. Anju Somani	Faculty Specialization	
10	Mrs. Shubhangi Pawar	Faculty Specialization	
11	Dr. Kumudini Das	Faculty Specialization	
12	Mrs. Soly Zachariah	Faculty Specialization	
13	Mrs. Ramya S. Kumar	Faculty Specialization	
14	Mrs. Sujata Shahabade	Faculty Specialization	
15	Mrs. Sreevidya T.V.	Faculty Specialization	
16	Mr. Omkar Sherkhane	Faculty Specialization	
17	Mr. Abhijeet Salvi	Faculty Specialization	

1. INTRODUCTION TO BACHELORS IN INFORMATION TECHNOLOGY (I.T.) PROGRAM

B.Sc. in Information Technology is a three years undergraduate programme that has been designed meticulously to meet the requirements of dynamic I.T. industry. This programme aims at fostering concepts of Information technology in students and equip them with the required technical, logical, problem solving and soft skills, which prepare them for the corporate world. It also focuses on inculcating effective communication skills which a software professional must have.No education is complete without incorporating social and moral values. This programme takes care of this aspect as well. The core courses of the program are supplemented by electives so that students can tailor the program according to their interest. State of art computer laboratories, in the campus, help students to practically implement the concepts learned. Qualified and experienced faculty members guide students in their project work. As we all know degrees in I.T. lead to rewarding and lucrative careers, excellent placement and incubation assistance is provided.

2. Program outcomes

Sr No	PO Title	POs in brief
PO1	Core Knowledge	Develop a strong foundation in the core principles and theories of their chosen field of study to pursue a profession of choice by understanding fundamental concepts, methodologies, and key terminologies
PO2	Research Skills	Trigger the research aptitude by developing basic research skills, including the ability to conduct literature reviews, design experiments, collect and analyze data, and draw meaningful conclusions.
PO3	Communication Skills	Communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing and also ability to present their work through written, oral, and visual presentations, including an original research proposal in a clear and understandable manner to both technical and non-technical audiences.
PO4	Ethical and Professional Behavior	Understand and adhere to ethical standards by recognizing the importance of integrity, honesty and ethical responsibility in scientific research and professional practice.
PO5	Teamwork and Collaboration	Ability to work cohesively to achieve common goals, solve problems and contribute to the success of a project or task paving way to individual and collective growth.
PO6	Adaptability and Lifelong Learning	Engage themselves in lifelong learning to keep up with the pace of changing technology and interdisciplinary approach to provide better solutions and new ideas for the sustainable developments
PO7	Technical Skills	Acquisition of specialized technical skills and expertise relevant to the specific field of study i.e advanced laboratory techniques, computational skills, or other specialized methodologies.
PO8	Critical Thinking and Problem-Solving Skills	Graduates would be equipped with the ability to analyze information critically, think logically, and solve complex problems. Applying scientific methods, mathematical reasoning, and logical approaches to real-world situations.

Program Specific Outcomes

Sr No	PSOs in brief
PSO1	Possess skill sets in information management, networking, web designing, mobile app development, Database management, programming and testing.
PSO2	Effectively integrate I.T. based solution in the users domain after properly analyzing the requirements and the constraints.
PSO3	Develop an ability to use appropriate techniques, skills and tools required for computing problems
PSO4	Ability to comprehend and write effective project reports in a multidisciplinary environment in the context of changing technologies.

Course Structure

Semester I						
Course Code	**Course Type**	**Course Title**	**Theory/ Practical**	**Marks**	**Credits**	**Lectures// Week**
PUSIT101	**MAJ**	Mathematical And Statistical Techniques	Theory	100	2	4
PUSIT102	**MAJ**	Python Programming	Theory	100	2	4
PUSIT103	**DISCMIN**	Database Management System	Theory	100	3	4
PUSIT104	**SEC**	It Fundamentals And Problem Solving	Theory	100	2	online
PUSIT105P	**MAJ**	Practical (PUSIT101)	Practical	50	2	2
PUSIT106P	**MAJ**	Practical(PUSIT102) + Practical (PUIT103)	Practical	100	2	2
PUAEC101	**AEC**	Effective Communication Skills	Theory/ Practical	100	2	3
PUVAC101	**VAC**	Human Values	Theory	100	2	3
PUIKS101	**IKS**	Indian Knowledge System 1	Theory/ Practical	100	2	3
PUIDC10	**IDC**	To Be Taken From Pool	Theory/ Practical	100	3	3
Total				950	22	30
All Subjects having Field Project as part of Continuous Assessment-2						

Abbreviations:

IDC : Interdisciplinary Courses
AEC : Ability Enhancement Course
SEC : Skill Enhancement Course
VAC : Value Added Course

Course Structure

Semester II

Course Code	Course Type	Course Title	Theory/ Practical	Marks	Credits	Lectures / Week
PUSIT201	**MAJ**	Statistical Methods and testing of Hypothesis	Theory	100	2	4
PUSIT202	**MAJ**	Core java	Theory	100	2	4
PUSIT203	**DISCMIN**	Web Programming	Theory	100	3	4
PUSIT204	**SEC**	Computer Networks	Theory/ Practical	100	2	online
PUSIT205P	**MAJ**	Practicals(PUSIT201)	Practical	50	2	2
PUSIT206P	**MAJ**	Practicals(PUSIT202)+ Practicals(PUSIT203)	Practical	100	2	2
PUAEC201	**AEC**	Languages(To be taken from pool)	Theory	100	2	3
PUVAC201	**VAC**	To be taken from pool	Theory	100	2	3(online)
PUIKS201	**IKS**	Indian Knowledge System 2	Theory/ Practical	100	2	3
PUIDC20	**IDC**	To be taken from pool	Theory/ Practical	100	3	3
Total				950	22	27

All Subjects having Field Project as part of Continuous Assessment-2

Abbreviations:

AEC : Ability Enhancement Course
SEC : Skill Enhancement Course
VAC : Value Added Course

Evaluation Pattern

Marking Code	Marking Scheme
A	60 Marks Final Exam, 20 Marks Internal Exam, 20 Marks Project.
B	60 Marks Final Exam, 40 Marks Internal Exam.
C	100 marks distributed within report /case study/ project/ presentation etc.
D	50 Marks Practical Examination.(10 marks viva,10 marks Journal,30 marks Program Executions)

SEMESTER I

Course Code	Course Type	Course Title	Evaluation Pattern
PUSIT101	MAJ	Mathematical And Statistical Techniques	A
PUSIT102	MAJ	Python Programming	A
PUSIT103	DISCMIN	Database Management System	A
PUSIT104	SEC	It Fundamentals And Problem Solving	C
PUSIT105P	MAJ	Practical (PUSIT101)	C
PUSIT106P	MAJ	Practical(PUSIT102) + Practical (PUIT103)	D
PUAEC101	AEC	Effective communication Skills	C
PUVAC101	VAC	To be taken from pool	C
PUIKS101	IKS	Indian Knowledge System 1	C
PUIDC10	IDC	To be taken from pool	C

SEMESTER II

Course Code	Course Type	Course Title	Evaluation Pattern
PUSIT201	MAJ	Statistical Methods and testing of Hypothesis	A
PUSIT202	MAJ	Core java	A
PUSIT203	DISCMIN	Web Programming	A
PUSIT204	SEC	Computer Networks	C
PUSIT205P	MAJ	Practicals(PUSIT201)	D
PUSIT206P	MAJ	Practicals(PUSIT202)+ Practicals(PUSIT203)	D
PUAEC201	AEC	Languages(To be taken from pool)	C
PUVAC201	VAC	To be taken from pool	C
PUIKS201	IKS	Indian Knowledge System 2	C
PUIDC20	IDC	To be taken from pool	C

SEMESTER-I

BOS	Computer Science
Class	F.Y. B.Sc. I.T.
Semester	I
Course Name	Mathematical Methods & Statistical Techniques
Course Code	PUSIT101
Type of Course	Major
Level of the Subject	Basic
Credit Points	2Theory + 2 Practical

Course Objectives:

1. To develop an interest in discrete concepts of mathematics.
2. To provide an understanding of daily use statistical techniques

Unit No.	Name of Unit	Topic No.	Contents	Hours
1	IKS	1.1	Introduction, Addition, Subtraction Multiplication ,Division using Vedic Mathematics	10
		1.2	Duplex of any Digit Number Straight Squaring using Duplex Method Square Root Using Duplex Method	
		1.3	Calendar- estimation using vedic math	
2	Introduction to linear algebra	2.1	Definition, Types of matrices, algebra of matrices, Determinant of a matrix (up to 3 by 3 order), Eigen values & Eigen vectors.	10
		2.2	Computing Terms of a Recursively Defined Sequence, Solving Recurrence Relations by Iteration , Recursion Tree Method	
		2.3	Definition, Magnitude of Vectors, Vector Arithmetic-Addition, Subtraction , Scalar Multiplication of Vectors Product - Dot Product, Cross Product	

3	Introduction to statistics	3.1	Data collection methods: attribute, variable, discrete and continuous variable, Frequency distribution tables: Grouped and ungrouped frequency distribution tables	10
		3.2	Measures of central tendency: Mean, Median, Quartiles, and mode for raw data, discrete, grouped frequency distribution.	
		3.3	Absolute & relative measures: Range, Quartile deviation, Mean deviation from mean , Variance and standard deviation, Relative measures: Coefficient of Range, Coefficient of Quartile Deviation, coefficient of variation for raw data, discrete and grouped frequency distribution	
4	Correlation, Regression &	4.1	Correlation : Types of correlation; perfect positive, moderate positive, perfect negative, moderate negative and absolute no correlation with scatter diagram.	10
		4.2	Karl Pearson's coefficients of correlation, Spearman's Rank correlation coefficient with and without repeated rank	
		4.3	Regression equations of Y on X and X on Y using regression coefficients method . Properties of the regression equation.	
Total No. of Lectures				**40**

Course outcomes:

1. Identify the uses and applications of vedic math in IKS.
2. Recognises the Eigenvectors and Eigenvalues , and identifies the rank of matrices .
3. Analyse and compare different sets of data. Also classify the data.
4. Calculate and interpret the various measures of central tendency,
5. Constructing the lines of regression .
6. Estimating the relation between the variables

References:

1. Discrete Mathematics with applications, Susanna. S. Epp, Cengage Learning Publication, 4th edn.
2. Discrete Mathematics, Saymour Lipschutz, Marc Lipson, Tata MC Graw hill
3. Discrete Mathematics and its applications, Kennith H Rosen, Tata MC Graw hill
4. linear algebra , Gilbert strang
5. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

CASE STUDY	
1	**Relationship Between Study Hours and Exam Scores** A university professor wants to investigate the relationship between the number of hours students study and their exam scores. To accomplish this, the professor collects data from a sample of 10 students. The table below shows the hours studied (independent variable, X) and the corresponding exam scores (dependent variable, Y) for each student:(Supporting data will be provided based on that evaluation questions has to be answered)
2	**Supermarket Sales** ABC Supermarket is analyzing its sales data for the past month. They are interested in understanding the average sales figures for different departments to better allocate resources and plan promotions. The following table summarizes the sales data for five departments (A, B, C, D, and E) for the month of March:(Supporting data will be provided based on that evaluation questions has to be answered.

Practicals

Practical No.	Details	Hours
1.	Introduction to R-Software : Basic commands in R	2
2.	Graphs and Diagram : Bar , Histogram, Pie, frequency polygon	2
3.	Matrix Operations : Addition, Subtraction, Multiplication,Power of a matrix	2
4	Rank & Inverse of Matrices	2
5.	Measures of Central Tendency: Mean , median, mode, quartiles of ungrouped data	2
6.	Measures of Central Tendency: Mean , median, mode, quartiles of grouped data	2
7.	Measure of Dispersion: Absolute & relative measures of grouped data	2
8.	Measure of Dispersion: Absolute & relative measures of ungrouped data	2
9.	Correlation & Scatter diagram: Karl Pearson's correlation coefficient	2
10.	Regression -line of regressions	2
	Total No of Lectures	20

BOS	Computer Science
Class	F.Y.B.Sc. I.T.
Semester	I
Course Name	Python Programming
Course Code	PUSIT103
Type of course	Major
Level of the Subject	Medium
Credit points	4

Course Objectives:

1. Students will be able to acquire programming skills and Object Oriented Skills in Python
2. To develop the skill of designing Graphical user Interfaces and to develop the ability to visualize the data using Visualization libraries.

Unit No.	Name of Unit	Topic No.	Contents	Hours
1	Introduction , Control flow statement & String	1.1	**Overview:** what is python? Features of python. Installation of python. Running Python program, Interactive Mode and Script Mode. Comments,variable,keyword,DataType, Type conversion,Operators, indentation.	10
		1.2	**Order of Operations.** Conditionals and Loops: if statement, else Statement, elif Statement, while loop, for loop, break, continue, pass Statement, else statement.	
		1.3	**Strings:** String Slices, Searching, Looping and Counting, String Methods, String Comparison, String Operations.	
2	Working with Lists, Tuples & Sets	2.1	**Lists:** Defining List, Updating and Accessing Elements, traversing a List, Deleting elements from List, Built-in List Operators, basic list operation, Built-in List functions and methods	10
		2.2	**Tuples:** Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Iteration, Built-in Tuple Functions	
		2.3	**Sets:** Creating a Set, Access Set Items, Add Set Items, Remove Set Items, Loop Sets, Join Sets, Set Methods.	

3	Dictionary, Array & Functions	3.1	**Dictionary:** Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Methods.	10
		3.2	**Array:** Advantages of Array, Creating An Array, Importing the array module and numpy module, Processing the arrays.writing modules,importing objects from modules, Python Built-in built Modules (Math, Random.)	
		3.3	**Functions:** types of function, Defining-calling and returning (single and multiple) results from a function, Arbitrary arguments, Keyword arguments, default arguments, recursion,.	
4	Files , GUI Programming and Visualization	4.1	**Files:** Types of Files, Creating and reading Text Data, File Methods to read and write data, file modes, seek() method, the Pickle module ,reading and writing CSV files.	10
		4.2	**Layout management in Tkinter(pack,grid,place)** GUI Programming using tkinter (Widgets) : Button, Checkbutton, Entry, Frame, Label, Listbox, Radiobutton,	
		4.3	**Visualization library:** Gain knowledge of python visualization libraries matplotlib, etc.. create a plot of retrieved data (Scatter plot, Histogram, Line chart, Bar Chart, Pie Chart)	
Total No. of Lectures				40

Course Outcomes:

1. Memorize the variable usability, conditional checking, looping structure.
2. Differentiate the data storage and accessibility from various types of data storage.
3. Illustrating the functionality of breaking down the task and reusing the code using functions.
4. Building the data hierarchy using Inheritance by classes and objects.
5. Apply the functionality to store/retrieve the input and output data on the permanent basis.
6. Create the GUI applications to solve real-life problems and Develop the various graphs to visualize the data.

References:

1. Core Python Programming , Dr. R. Nageswara Rao, dreamtech, 2017
2. Fundamentals of Python: First Programs, Kenneth A. Lambert, CENGAGE 3. Learning, 2012
3. https://www.geeksforgeeks.org/python-gui-tkinter/
4. https://www.geeksforgeeks.org/turtle-programming-python/
5. Data Visualization with Python, Mario Dobler, Tim Grobmann, Packt Publishing, 2019
6. https://www.w3schools.com/python/
7. Core Python Programming (2nd Edition) by Wesley J. Chun

CASE STUDY	
1	A library requires a software solution to efficiently manage its collection of books. The existing manual system is time-consuming and prone to errors. The library needs a digital solution that allows librarians to easily add new books, update existing ones, search for specific titles or authors, and remove books from the inventory.
2	Acme Entertainment, a leading gaming company, aims to diversify its portfolio by developing a new Python-based game with a Graphical User Interface (GUI). The company seeks to create an engaging and interactive gaming experience to attract a wider audience. The game should be intuitive, visually appealing, and incorporate addictive gameplay mechanics to keep players entertained. Acme Entertainment is looking for a comprehensive solution that encompasses game design, coding, and GUI implementation, catering to both novice and experienced gamers.

Practicals

Practical No.	Details
1.	a. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old. b. Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user. c. Write a program to generate the Fibonacci series. d. Conditional Statement : In a company an employee is paid as under: If his basic salary is less than Rs. 1500, then HRA = 10% of basic salary and DA = 90% of basic salary. If his salary is either equal to or above Rs. 1500, then HRA = Rs. 500 and DA = 98% of basic salary. If the employee's salary is input through the keyboard, write a program to find his gross salary. e. Write a python program to generate the various patterns.
2.	a. Write a program that takes two lists and returns True if they have at least one common member. b. Write a Python program to display sum of list elements c. write a program to find even and odd nos from given list
3.	a. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5. b. WAP to display cumulative elements of a given list: For eg: List is[10,20,30,40] Output: [10,30,60,100] c. WAP to remove all odd numbers from a given list d. WAP to accept values from a user and create a tuple
4.	a. Write a Python script to sort (ascending and descending) a dictionary by value. b. Write a Python script to concatenate the following dictionaries to create a new one. Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60} Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60} c. Write a Python program to sum all the items in a dictionary.

5.	a. Write a Python program to write and read from a text file. b. Write a Python program to append text to a file and display the text. c. Write a Python program to write and read from binary file
6.	a. Write a program that makes use of built-in mathematical functions. b. Write a program that makes use of built-in random module functions.
7.	a. Write a recursive function to print the factorial for a given number. b. Write a python function to perform the basic mathematical operations. c. Write a function that reverses the user defined value. d. Write a function to check the input value is Armstrong and also write the function for Palindrome.
8.	a. Write a python program to study , define edit arrays and perform arithmetic operations using array module b. Write a python program to generate an array with numpy and perform following operations - traversing an array - accessing an array element - insertion and deletion of element
9.	a. Create a GUI based calculator using the tkinter library. b. Create a login interface and validate username and password.
10.	a. Write a Python program to plot the function y = x2 using the matplotlib visualization libraries. b. Write a Python programming to create a pie chart of the popularity of programming Languages.
	Sample data: Programming languages: Java, Python, PHP, JavaScript, C#, C++ Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7 c. Write a Python programming to display a bar chart of the popularity of programming Languages. Use a different color for each bar. Sample data: Programming languages: Java, Python, PHP, JavaScript, C#, C++ Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7
	Total No Of Lectures:20

BOS	Computer Science
Class	F.Y. B.Sc. I.T.
Semester	I
Subject Name	Database Management System
Subject Code	PUSIT102
Type of Course	Discipline Minor
Level of the Subject	Basic
Credit Points	3

Course Objectives:

1. Introduction of the concept of the DBMS with respect to the relational model,
2. Specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases.

Unit No.	Name of Unit	Topic No.	Content	Hours
1	Introduction to DBMS and Data Models	1.1	Introduction to DBMS : Data, ,Database, Application of DBMS ,DBMS – Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction/ Data independence,	10
		1.2	DBMS Architecture, Client/Server Architecture, Three –Tier architecture Data models - (relational, hierarchical, network Object Oriented).	
		1.3	Entity Relationship Model – ER diagram Entities and types, attributes and types, entity sets, relations and Notations, relationship sets, aggregation / generalization.	
2	Introduction to Database Languages and Constraints	2.1	DDL Statements :Creating Databases, Using Databases, data types, Creating Tables Altering Tables(alter with add columns, alter to drop columns), Renaming Tables, Dropping Tables.	10

		2.2	DML Statements : insert, select, update, delete, unique records, conditional select, Clauses- where, aggregate functions (count, min, max, avg, sum), group by clause, having clause, order by, distinct	
		2.3	Relational Constraints - primary key, referential integrity(foreign key), unique constraint, Not Null constraint, Check constraint, default constraint.	
3	Normalization and Join Operation	3.1	Schema refinement and Normal forms(Normalization):Functional dependencies(Anomalies), first, second, third, and BCNF normal forms based on primary keys.	10
		3.2	Relational Algebra and Join : fetching operations (selection, projection) Joining Tables –equi join(With ansi, non ansi, using clause), natural joins, inner join, outer join (left outer, right outer, full outer), not equi join, cross join.	
		3.3	Database Protection: Security Issues, Threats to Databases, Security Mechanisms, Role of DBA	
4	Subqueries, View and Database Functions	4.1	Functions – String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now)	10
		4.2	Subqueries – subqueries with IN, NOT IN, Nested query, query to find second highest salary, third highest salary.	
		4.3	Views - Introduction to View, storing complex queries, creating, altering dropping the view, Create view through Join and Subquery Operation.	
Total No. of Lectures				**40**

Course Outcomes:

1. Describe the basic concept of DBMS and the DBMS Architecture.
2. Develop the skills of Database Languages with DDL And DML Commands.
3. Identify how to make use of Constraints to limit/restrict data.
4. Apply the Normalization concept while designing the database.
5. Choose various Join Operations according to situations.
6. Design and create databases using Subqueries and View.

References:

1. Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems,

Pearson Education, Sixth Edition, 2010
2. Ramakrishnam, Gehrke, Database Management Systems, McGraw-Hill, 2007 3.
3. Joel Murach, Murach's MySQL, Murach, 2012
4. https://www.geeksforgeeks.org/
5. Database System Concepts, Korth
6. Robert Sheldon, Geoff Moes, Beginning MySQL, Wrox Press, 2005.

CASE STUDY	
1	Design E-R-Data Model Based on following case study. Company has Employees, departments, and projects . Company is organized into departments , Department controls a number of projects, Number of employees working with multiple projects, Employee: store each employee's name, Contact number, address, salary, sex (gender), and birth date , Keep track of each employee belongs to department also notate the relationship amongst each relation also predict the attributes of each entity.
2	Assume you have been asked to design the database structure for a job site. What NORMALIZED table data model / table design would you recommended for storing the personal data of the candidates like name , address, and phone number and their skill in multiple languages so as to ensure that when a company searches based on a particular set of skills, the query is quick to return the result. Note that each candidate would have multiple Skills.(Hint : You will need to have 3 tables in the design).

Practicals

Practical No.	Details
1	Write a DBMS Query to perform DDL Command. i) Create ii) Alter(add, drop, rename) iii)Drop
2	Write a DBMS Query to perform DDL Command i) insert ii) Select iii)Update iv) Delete
3	Write a DBMS Query to perform Clauses i) Where ii) Group by with all aggregate functions iii)Having iv) order By v) Distinct

4	Write a DBMS Query to perform Constraint i) Unique ii) NOT NULL iii) D efault iv)Check v) Primary Key vi) Foreign Key
5	Write a DBMS Query to perform Join Operations: i) Equi Join(ansi, non ansi, using clause) ii) Inner Join iii)Natural Join.
6	Write a DBMS Query to perform Join Operations: i) Non-Equi Join, ii) Cross Join, iii)Outer Join(Left,Right,Full).
7	Write a DBMS Query to perform All String Functions:
8	Write a DBMS Query to perform Following Functions ii) Math Functions iii)Date Functions
9	Write a DBMS Query to perform Subqueries: i) IN and NOT IN ii) Second Highest iii) Third Highest
10	Write a DBMS Query to perform View: i) Using Join Operation ii) Using Subqueries.
Total No. of Lectures:20	

SEMESTER-II

BOS	Computer Science
Class	F.Y. B.Sc. I.T.
Semester	II
Course Name	Statistical Methods & Testing of Hypothesis
Course Code	PUSIT201
Type of Course	Major
Level of the Subject	Basic
Credit Points	4

Course Objectives:

1. To understand an interest in the concepts of ancient methods of learning Mathematics.
2. To inculcate interest in research through analyzing the data with the help of R.

Unit No.	Name of the Unit	Topic N o.	Name of Topic	Hours
1	IKS	1.1	Squares and square roots , Cubes and cube roots	10
		1.2	Divisibility	
		1.3	Strategies for Enhanced Mental Calculations- Nikhilam Sutra Nikhilam Sutra,Urdhva Tiryak Sutra,Ekadhikena Purvena Sutra, Anurupye Sutra, Yavadunam Tavadunikritya Varga Samam	
2	Sampling Distributions	2.1	Introduction, Factors that influence sampling distribution,Types of distributions- Sampling distribution of mean/ proportion	10
		2.2	Binomial Distribution- Properties and problems based on Binomial distribution Poisson Distribution- Properties and problems based on Poisson distribution	
		2.3	Normal distribution-properties and problems based on Normal distribution, Central limit theorem, Chi square distribution -definition and properties, t distribution - definition and properties , F distribution -definition and properties	

3	Testing of Hypothesis (Parametric test)	3.1	Hypothesis- Null and Alternative, Types of error in hypothesis testing, level of significance,One tailed two-tailed test, critical region, p-value, Confidence interval for mean and proportion	10
		3.2	Large sample test (z test)-single mean, two means, single proportion, two proportions	
		3.3	Small sample test(t test) one sample mean, paired t test, unpaired t test	
4	ANOVA and Chi-Square test	4.1	Application and importance of ANOVA	10
		4.2	One Way ANOVA - procedure and examples	
		4.3	Chi-square test of goodness of fit , Chi- square test for association, Chi square test for independence of attributes, Yates correction	
			Total number of Lectures	**40**

Course Outcomes:

1. Identify when to use a parametric method. Different parametric methods in estimation, testing, model fitting, and in analyses.
2. Develops the ability to analyze a problem and understand the appropriate statistical technique to analyze it.
3. Develops the use of the inferential statistical tools to analyze a problem.
4. Apply Parametric statistical hypothesis testing to make a decision.
5. Explain the results obtained using statistical tools based on a problem scenario. and introduces ANOVA for analyzing a problem in higher level .
6. Understands the tricks to do the mathematical calculations with ease.

References:

1. Ross, S.M. (2006): A First course in probability. 6th Ed^{n} Pearson
2. Kulkarni, M.B., Ghatpande, S.B. and Gore, S.D. (1999): Common statistical tests. Satyajeet Prakashan, PuneGupta, S.C. and Kapoor, V.K. (2002):
3. Gupta, S.C. and Kapoor, V.K. (4th Edition): Applied Statistics, S. Chand and Sons, New Delhi
4. Trivedi, K.S.(2009) : Probability, Statistics, Design of Experiments and Queuing theory, with applications of Computer Science, Prentice Hall of India, New Delhi
5. Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi

CASE STUDY	
1	**Testing the Mean Lifetime of Fluorescent Light Bulbs** A company manufactures fluorescent light bulbs and claims that the mean lifetime of their bulbs is 1600 hours. However, there are concerns about the actual mean lifetime being less than the claimed value. As a data analyst, you have been tasked with conducting a hypothesis test to determine whether there is sufficient evidence to support the claim that the mean lifetime of the company's bulbs is

	indeed 1600 hours. A sample of 400 fluorescent light bulbs produced by the company has been selected for analysis. The sample has a mean lifetime of 1570 hours with a standard deviation of 150 hours. (Based on the data , the student has to find the interpretations)
2	**Analyzing Customer Satisfaction Levels in a Restaurant Chain** A restaurant chain wants to assess the satisfaction levels of its customers across different locations. They have collected data on customer feedback regarding their dining experience, categorized into three satisfaction levels: "Satisfied," "Neutral," and "Dissatisfied." The restaurant chain aims to determine if there is a significant difference in customer satisfaction levels among its various locations. As a data analyst, you are tasked with conducting a Chi-square test to analyze the data and provide insights to the management. The dataset consists of customer feedback collected from five different restaurant locations. For each location, the number of customers falling into each satisfaction category (Satisfied, Neutral, Dissatisfied) is recorded. (Based on the data , the student has to find the interpretations)

Practicals

S.N.	Topic	No of Lectures
1	Basic inbuilt commands in R for testing of hypothesis	2
2	R program on Binomial distribution	2
3	R program on Poisson distribution	2
4	R program on Normal distribution	2
5	R program on one sample and two sample mean Z test	2
6	R program on one sample and two sample proportion Z test	2
7	R program on unpaired t test	2
8	R program on paired t test	2
9	R program on Chi square test	2
10	R program on ANOVA	2
	Total no of Lectures	20

BOS	Computer Science
Class	F.Y.B.Sc. I.T.
Semester	II
Course Name	Core Java
Course Code	PUSIT202
Type of course Discipline Specific	Major
Level of the Subject	Basic
Credit Points	4

Course Objectives:

1. To understand the basic concept of string handling and control flow statements.
2. To understand the apply the concepts of Exception handling to develop efficient and error free codes.

Unit No.	Name of Unit	Topic No.	Content	Hours
1	Fundamentals of Oops Programming, Configuration of Java And Introduction to Java Programming Environment	1.1	Introduction to Oops : What is Object Oriented? Basic Concepts of OOPS: Objects,Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism,Dynamic Binding.	10
		1.2	Configuration of Java : How to install java,java development kit (JDK, JRE, JVM, JIT),Features of java. How to set a path in java?Setting the path environment variable.Java Compiler and Interpreter, java programs,structure of java program,	
		1.3	Introduction to Java: keywords,Comments, Data types, variables (declaration, typesnaming convention rules) and Constants, operators, Type casting. Input from keyboard.	

2	Selection statements, Looping Statements, Jumping Statements, Array , String ,Classes & Objects	2.1	Control Flow Statements: if, if...else Statement, The switch...case Statement Iterative Statement: The while Loop, The do ... while Loop, The for Loop, The for each Loop, nested loops. Branching Statements: The break and continue & return statement.	10
		2.2	Arrays: Create arrays, extracting elements, searching, sorting. String : String , types , methods, string manipulation.	
		2.3	Classes & Object: Defining a class,Instantiating Objects from a class, methods, accessing a method, method returning a value,method's arguments, method overloading,variable arguments [Var args], static field and static methods.	
3	Construct or, Packages, Inheritance	3.1	Constructor: Constructor and its types,constructor overloading, this keyword,	10
		3.2	Package : Creating Packages, Default Package,Importing Package. Access specifier	
		3.3	Inheritance: Inheritance and Access Control,Types of inheritance, super keyword, Method Overriding.	
4	Abstract Classes, Interfaces and Exception Handling	4.1	Abstract Classes: Abstract Classes, Abstract methods, How is an Interface different from an Abstract class?	10
		4.2	Interfaces: Interfaces, What is an Interface? Multiple Inheritance, functional interface,Lambda Expressions.	
		4.3	Exception Handling : What is Exception in Java? What is Exception Handling? Hierarchy of Java Exception classes, Types of Java Exceptions, Java Exception Keywords (try,catch , finally, throw & throws) ,Examples	
			Total number of Lectures	40

Course Outcomse:

1. Use the syntax and semantics of java programming language and basic concepts of OOP.
2. Understand the basic concept of string handling and control flow statements.
3. Explain the concepts of classes, objects , methods & constructors.
4. Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
5. Apply the concepts of Exception handling to develop efficient and error free codes.
6. Design simple command line applications which mimic the real world scenarios.

References:

1. Core Java 8 for Beginners- vaishali Shah,SharanamShah,publisher- SPD,1st Edition.
2. Java :The Complete Reference -Herbert Schildt, Publisher -Tata McGraw Hill ,9th Edition.
3. Murach's Beginning Java with Netbeans -Joel Murach , Michael Urban,Publisher- SPD,1st Edition
4. Core Java, Volume I:Fundamentals-Horstmann,Publisher- Pearson ,9th Edition.
5. https://www.geeksforgeeks.org/

CASE STUDY	
1	RBI bank declares to give interest to all the bank's customers. Now each nationalized bank will give different rates of interest to its customers. Nationalized bank are SBI,PNB,BOB,IOB.RBI wants to see the rate of interest given by All the banks.RBI wants the best suitable plan to achieve this task with redundancy of data and data should be secure
2	A-Z company is a perfect service provider for all the IT and software development requirements. The team leverages their knowledge in completing the projected goals and makes it possible to build the ideas as per the market demands. Apart from focusing on just making a website, the team of experts always focus on designing a platform that can take the client's business to another level.They always blend expertise, innovation & technology to design innovative masterpieces. Client satisfaction is what matters the most for the people at the A-Z company. The company is going to develop a Java project on the Student Management System

Practicals

Practical No	Details
1	a. Write a Java program that takes a number as input and prints its multiplication table up to 10. b. Write a Java program to print the area and perimeter of a circle.
2	Write a program to perform following tasks : a) Factorial b) Armstrong c) Prime Number e) Palindrome

3	Write a Java program to print following patterns
	a)
	*
	**
	***
	b)
	  *
	  * *
	* * *

4	a. Write a Java program to perform ascending order on a given 1-Dimension array. b. Working with 2-D arrays.
5	a. Write a Java program to implement methods, method overloading . b. Write a Java program to work with constructors, constructor overloading.

6	a. Write a Java program to reverse a string and also check whether it is a palindrome or not. b. Write a java program to work with string functions.
7	a. Write a Java program to implement different types of Inheritance. b. Write a Java program to implement method overriding, super keyword & this keyword.
8	a. Write a Java program to demonstrate the implementation of abstraction(abstract class & inheritance) b. Write a Java program to work with lambda expressions.
9	a. Write a Java program to implement exception handling by using try...catch & finally block.
10	Write a Java Order driven application which contains following operation: Enter Your Name : Enter Your Address : Select option : 1. Misal Pav : Rs. 50/- 2. Pizza : Rs. 250/- 3. Samosa : Rs. 15/- After confirming the order : Show all the details with the appropriate bill amount.
	Total No of Lectures:20

BOS	Computer Science
Class	F.Y.B.Sc. I.T.
Semester	II
Course Name	Web Programming
Course Code	PUSIT203
Type of course	Discipline Minor
Level of the Subject	Basic
Credit Points	3

Course Objectives:

1.To provide insight into emerging technologies to design and develop state.

2. The art web applications using client-side scripting, server-side scripting, and database connectivity.

Unit No.	Name of Unit	Topic No.	Content	Hours
1	HTML5 , CSS	1.1	**HTML5:** Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, using lists and backgrounds, Tables in HTML,Creating navigational aids: planning site organization, creating text based navigation bar, creating graphics based navigation bar, Images on a Web Page, Image Formats, Image Maps,Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for inserting Audio / Video on a web page.	10
		1.2	**CSS:** Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element	
2	JavaScript	2.1	JavaScript: Using JavaScript in an HTML Document, Programming Fundamentals of JavaScript – Variables, Operators, Control Flow Statements, Jumping Statements Functions – Defining and Invoking a Function, Defining Function arguments, Defining a Return Statement, Calling Functions,	10

		2.2	JavaScript Objects -Form Validation using JavaScript . Events and Event Handlers : General Information about Events, Defining Event Handlers, event : onClick, onDblClick, onBlur, onFocus, onSubmit.Popup Boxes : Alert, Confirm, Prompt.	
		2.3	JavaScript Objects -Form Validation using JavaScript . Events and Event Handlers : General Information about Events, Defining Event Handlers, event : onClick, onDblClick, onBlur, onFocus, onSubmit.Popup Boxes : Alert, Confirm, Prompt.	
3	Introduction to PHP	3.1	PHP: Variables and Operators, comment type, Program Flow, Working with Files and Directories, Working with arrays, functions : with argument and return statement, passing information with PHP using GET, POST.	10
		3.2	Formatting form variables, strings and string functions, regular expressions, number handling.Working with Databases,working with Cookies, session .	
4	Introduction to Bootstrap	4.1	JSON – Introduction,Overview,Syntax,Data Types,Objects,Comparison JSON with PHP Introduction to Bootstrap :What is Bootstrap , Advantages of Bootstrap Framework	10
		4.2	ChatGPT - Structure of ChatGPT and code of existing web page. Upload existing code based on chatGPT to optimize it and improve. Create end to end functional web page completely using AI(use Microsoft Copilot, chatGPT)	
Total No. of Lectures				40

Course Outcomes :

Identify basic HTML tags to write HTML programs and use concepts such as Table, Forms, Navigation etc..

1. To understand the basic concept of Cascading Style Sheets(CSS).
2. Examine the factors of Javascript code And determine the concept of Event Handling, popup boxes..
3. Analyzing the change in Validating a Form through Javascript.
4. Evaluate the role of PHP in Web Programming and apply PHP code on web pages to handle backend of any Web page.
5. To learn and create advanced standalone GUI concepts using bootstrap.

References:

1. Duckett, J. (2014). HTML & CSS: Design and Build Websites. Wiley.
2. McFarland, D. (2018). JavaScript & jQuery: The Missing Manual. O'Reilly Media.
3. Flanagan, D. (2011). JavaScript: The Definitive Guide (6th ed.). O'Reilly Media.
4. https://www.geeksforgeeks.org/
5. Robbins, J., & Robbins, A. (2016). Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5 (4th ed.). O'Reilly Media.

CASE STUDY	
1	Mr. X has developed a Food Delivery Application where the Home page has all the details of the Application where the user first has to register, for which one registration link has to be there which will redirect to the registration page. **Where** users can get access to the application after validating the data and give the solution what all validation can come up with to explain them in detail . After filling the form, the user will get a welcome message through the popup window. At the other side of the home page Navigation Bar will be provided which has four links (Home, Menu, Orders, Contact-Us, About Us).
2	Shopping Application has Home page with all the details of the Application including Navigation Bar which has four Link (Home, Product, Orders, Contact-Us, About Us) Give the solution where Product, Orders, Contact-Us has to be redirected to the next page. About Us has to jump on different sections of the same page. What will be the solution when a user will register for an application clicking a button? The system will give a message 'Welcome!!!' through a popup window.

Practicals

Practical No.	Details
1	Design a Web Page in HTML That Makes a Use of Following Concepts: i) Text Formatting Tags ii) List Elements iii) Image Tag iii) Image Mapping
2	Design a Web Page in HTML That Makes a Use of Table Tag: i) Simple Table ii) Rowspan iii) Colspan
3	Design a Web Page in HTML to perform i) Hyperlink ii) Navigation. iii) Multimedia iv) Form
4	Design a Web Page to Perform CSS Properties: i) Inline CSS ii) Internal CSS iii) External CSS

5	Write a Javascript Code to perform i) Operators, ii) Control Flow Statements and iii) Functions.
6	Write a Javascript Code to perform i) Popup Boxes, ii) Events and iii) form validation.
7	Write a HTML Code with Bootstrap Classes to perform following programs.(Buttons,Table,Images,Typography)
8	Write a HTML Code with Bootstrap Classes to perform following programs.(Basic Form, Navigation, Icons)
9	Write a HTML Code with Bootstrap Classes to perform following programs: i) Bootstrap ProgressBar ii) Panel iii) Alerts iv) Well v) Carousel
10	Write a PHP Code to perform Following Programs : i) If-else ii) Array iii) Functions iv) String Functions v) Cookies vi) Get and Post
Total No. Of Lectures:20	

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