GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code : BC02001011

Course / Subject Name : Data Structure

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Core Courses

Prerequisite:	Proficiency in a programming language
Rationale:	• To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures. • To introduce the concepts of algorithmic paradigms and basic data structures and their applications. • To analyze various algorithms for space and time complexity. • To implement and compare various searching and sorting techniques. • To apply appropriate data structures to solve different problems.

Course Outcome:

After completion of the course, student will able to:

No	Course Outcomes	RBT Level*
1	Demonstrate familiarity with data structures.	U
2	Implement concepts of linear data structures like array, stack, queue, linked list with their representation and perform different operations on them.	AP
3	Implement concepts of tree & graph with their representation and apply various operations on them.	AP
4	Implement concepts of hashing.	AP
5	Develop programs for Searching and Sorting.	AP

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)

1	INTRODUCTION TO DATA STRUCTURE: Data Management concepts, Data types – primitive and non-primitive, Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures-Linear & Non Linear Data Structures.	5	10
2	LINEAR DATA STRUCTURE Array: Representation of arrays, Applications of arrays, sparse matrix and its representation Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array representation of Priority Queue, Double Ended Queue, Applications of Queue Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked implementation of Stack, Linked implementation of Queue, Applications of linked list.	14	30
3	NONLINEAR DATA STRUCTURE : Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of TreesSome balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-Matrix Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)	14	30
4	HASHING AND FILE STRUCTURES : Hashing: The symbol table, Hashing Functions, CollisionResolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods.	06	15
5	Sorting & Searching: Sorting – Bubble Sort, Selection Sort, Quick Sort, Merge Sort Searching – Sequential Search and Binary Search	06	15
	Total Hours:	**45**	

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20%	**30%**	**50%**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Textbook:

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill.
2. Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International.

Reference Books:

1. Data structure in C by Tanenbaum, PHI publication / Pearson publication.
2. Fundamentals of data structure in C, Horowitz, Sahani & Freed, Computer Science Press.
3. Classical Data Structure, D. Samanta, PHI
4. Fundamental of Data Structure, (Schaums Series) Tata-McGraw-Hill.
5. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
6. Data Structures, schaum's Outlines,Adapted by G A PAI
7. Gilberg and Forouzan: "Data Structure- A Pseudo code approach with C" by Thomson publication

Suggested Course Practical List:

1. Introduction to pointers. Call by Value and Call by reference.
2. Introduction to Dynamic Memory Allocation. DMA functions malloc(), calloc(), free() etc.
3. Implement a program for stack that performs following operations using array. (a) PUSH (b) POP (c) PEEP (d) CHANGE (e) DISPLAY
4. Implement a program to convert infix notation to postfix notation using stack.
5. Write a program to implement QUEUE using arrays that performs following operations (a) INSERT (b) DELETE (c) DISPLAY
6. Write a program to implement Circular Queue using arrays that performs following operations. (a) INSERT (b) DELETE (c) DISPLAY
7. Write a menu driven program to implement following operations on the singly linked list. (a) Insert a node at the front of the linked list. (b) Insert a node at the end of the linked list. (c) Insert a node such that linked list is in ascending order.(according to info. Field) (d) Delete a first node of the linked list. (e) Delete a node before specified position. (f) Delete a node after specified position. 7. Write a program to implement stack using linked list.
8. Write a program to implement queue using linked list.
9. Write a program to implement following operations on the doubly linked list. (a) Insert a node at the front of the linked list. (b) Insert a node at the end of the linked list. (c) Delete a last node of the linked list. (d) Delete a node before specified position.
10. Write a program to implement following operations on the circular linked list. (a) Insert a node at the end of the linked list. (b) Insert a node before specified position. (c) Delete a first node of the linked list. (d) Delete a node after specified position.
11. Write a program which create binary search tree.

12. Implement recursive and non-recursive tree traversing methods inorder, preorder and postorder traversal.
13. Write a program to implement Queue Sort
14. Write a program to implement Merge Sort
15. Write a program to implement Bubble Sort
16. Write a program to implement Binary Search

List of Laboratory/ Active Learning Assignment: If any

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

CO- PO Mapping:
*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

Semester 2	**Subject Name: Data Structure**										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	3	-	-	-	-	-	-
CO3	3	3	2	-	1	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	3	-	2	-	-	-	-	-	-

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code : BC02001021

Course / Subject Name : Database Management System

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Core Courses

Prerequisite:	Basic knowledge of working with computers
Rationale:	• To understand the fundamental concepts of Database Management Systems. • To understand the concepts necessary for designing, using and implementing database systems and applications

Course Outcome:

After completion of the course, student will able to:

No.	Course Outcomes	RBT Level*
1	Describe the core concepts of DBMS & Differentiate various database architectures	UN
2	Analyze database model and Design relational database using E-R model and UML Classes	AP
3	Normalize schema relations up to 4NF using concepts of functional dependency	AP
4	Perform various relational algebra operations on various relational model/database	AP
5	Develop transaction schedules to ensure recoverability and serializability in database systems, applying the principles of transaction properties to maintain data consistency and integrity in real-world scenarios.	AP

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	Introduction to Database System Database and Users: Introduction (Basic Concepts: Data, Database, Database systems, Database Management Systems), Characteristics of	**8**	**15%**

	Database Approach, Actors on Scene, Workers behind the Scene, Advantages of using the DBMS approach Database System Concepts and Architecture: Data Models, Schemas, Instances, the three schema architectures and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMS, Classifications of Database Management Systems.		
2	Entity Relationship Diagram Using high level conceptual data models for database design (Design Phases of database design), Entity types, Entity Sets, Attributes and keys, Relationship Types, Relationship sets, Roles and structural constraints, Weak entity Types, Refining the ER diagram for company Database, Entity Relationship Diagram Naming conventions Design issues, Example of other Notation: UML class diagram, Relationship types of degree higher than 2 Subclasses, Super Classes, Inheritance Specialization and Generalization Relational Database design by ER and EER to Relational Mapping	**2**	**20%**
3	Database Design Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal Form.	**12**	**25%**
4	Relational Model concepts: Relational Model concepts, Relational Model constraints and Relational Database Schemas Relational Algebra: Unary Relational Operations (Select and Project), Relational Algebra operations from Set Theory, Binary Relational Operations (JOIN and Division) and Additional Relational Operations (Generalized projection, aggregate functions and grouping, Recursive Closure Operations, Outer Join Operations, the outer union operation).	**10**	**25%**
5	Introduction to Transaction Processing Concepts: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing Schedule Based on Recoverability and Serializability.	**12**	**15%**
	Total Hours:	**45**	**100%**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20%	30%	50%	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Textbook:

1. Ramez Elmsari,Shamkant B Navathe, "Fundamentals of Database Systems", Pearson Education, 7th Edition.
2. Alexis Leon, Mathews Leon, "Essentials of Database Management Systems" (Second reprint 2009), Tata McGraw Hill Publication.

Reference Books:

1. C. J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems" 8 th Edition (2006), Pearson Education
2. Silberschatz, Korth, Sudarshan, "Database System Concepts" 5 th Edition, McGraw Hill
3. S. K. Singh, "Database Systems: Concepts, Design and Applications", Pearson Education
4. ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
5. Ramakrishnan, Gehrke, "Database Management Systems" 3rd Edition, McGraw Hill
6. Peter Rob, Carlos Coronel, "Database Systems: Design, Implementation and Management", 7th Edition (2007), Cengage Learning

Suggested Course Practical List:

Tools: MySQL (any variant of MySQL like Maria DB etc.)
Topics:

1	Introduction to Database: MySQL, Installation, Data Types
2	Manage Database: Create Database, Drop Database, Select Database (MySQL> prompt)
3	Create Table: The Create Table Command, Creating a table from a table (with data, without data, with all columns, with selected columns) Drop Table Alter Table
4	Study DML Commands (Select, insert, update, delete)
5	Sorting Data, Handling Null values (IS NULL)
6	Join
7	Like Clause , REGEXP
8	Transaction Control statements: Commit, Rollback
9	Advanced Concepts: View, Index, Sequences
10	Database Export / Import
11	Study single row functions: String functions, Numeric Functions, Date Functions
12	Study aggregate / group functions
13	Study sub query concepts

14	Constraints: Primary Key, Foreign Key, Check, Default, Not Null, Unique
15	Set Operators
16	Compound Statement Handling: Syntax, Variables, flow of control, condition handling, Cursor Management, Create procedure and Function
17	Create Triggers
18	Data dictionary
19	Security / privileges (Desirable)

References:

1. Steve Suehring, Tim Converse, Joyce Park, PHP 6 and MySQL Bible, Wiley
2. Andrea Tarr, PHP and MySQL 24-Hour Trainer, Wiley

Practicals to perform: (SQL and PL/SQL)

Set 1

DEPARTMENT (dept_no, dept_name, location)

1. Create the Simple DEPARTMENT Table.
2. Display structure of department table.
3. Insert below records into Department Table

Dept_no	Dept_name	Location
10	Account	NY
20	HR	NY
30	Production	DL
40	Sales	NY
50	EDP	MU
60	TRG	
110	RND	AH

4. Display all records of Department table
5. Display all department belonging to location 'NY'
6. Display details of Department 10
7. List all department names starting with 'A'
8. List all departments whose number is between 1 and 100
9. Delete 'TRG' department
10. Change department name 'EDP' to 'IT

Set 2

EMPLOYEE (emp_id, emp_name, birth_date, gender, dept_no, address, designation, salary, experience, email)
DEPARTMENT (dept_no, dept_name, location)

Do as directed:

Create the EMP Table with all necessary constraints such as In EMP TABLE: Employee id should be primary key, Department no should be Foreign key, employee age (birth_date) should be greater than 18 years, salary should be greater than zero, email should have (@ and dot) sign in address, designation of employee can be “manager”, “clerk”, “leader”, “analyst”, “designer”, “coder”, “tester”.

1. Create DEPT table with neccessary constraint such as
2. Department no should be primary key, department name should be unique.
3. After creation of above tables, modify Employee table by adding the constraints as
4. ‘Male’ or ‘Female’ in gender field and display the structure.
5. Insert proper data (at least 5 appropriate records) in all the tables.
6. Describe the structure of table created
7. List all records of each table in ascending order.
8. Delete the department whose loction is Ahmedabad.
9. Display female employee list
10. Display Departname wise employee Names
11. Find the names of the employee who has salary less than 5000 and greater than 2000.
12. Display the names and the designation of all female employee in descending order.
13. Display the names of all the employees who names starts with ‘A’ ends with ‘A’.
14. Find the name of employee and salary for those who had obtain minimum salary.
15. Add 10% raise in salary of all employees whose department is ‘IT’.
16. Count total number of employees of ‘IT’ department.
17. List all employees who born in the current month.
18. Print the record of employee and dept table as “Employee works in department ‘MBA’.
19. List names of employees who are fresher’s (less than 1 year of experience).
20. List department wise names of employees who has more than 5 years of experience.
21. Crete Sequence to generate department ID
22. List department having no employees

Set 3

Create the following table:
Salesmen table (SNUM, SNAME , CITY , COMMISSION)
Customers (CNUM, CNAME , CITY , RATING , SNUM)
Orders (ONUM, AMOUNT, ODATE, CNUM, SNUM)

SNUM : A unique number assigned to each salesman. SNAME :Thenameofsalesman. CITY :Thelocationof salesmen. COMMISSION: The Salemen's commission on orders

CNUM : A unique number assigned to each customer. CNAME : The name of the customer. CITY : The location of the customer. RATING : A level of preference indicator given to this customer. SNUM : The number of salesman assigned to this customer.

ONUM : A unique number assigned to each order. AMOUNT : The amount of an order. ODATE : The date of an order. CNUM : The number of customer making the order. SNUM : The number of salesman credited with the sale.

Do as directed:

1. Write an Insert script for insertion of rows with substitution variables and insert appropriate data.
2. Produce the order no, amount and date of all orders.
3. Give all the information about all the customers with a specific salesman number.
4. Display the following information in the order of city, sname, snum and commission.
5. List of rating followed by the name of each customer in particular one city e.g. Surat.
6. List of snum of all salesmen with orders in order table without any duplicates.
7. List of all orders for more than certain amount e.g. more than Rs. 1000.
8. List of names and cities of all salesmen in one city e.g. London with commission above 10%.
9. List all customers whose names begins with a letter 'C'.
10. List all customers whose names begins with letter 'A' to'G'.
11. List all orders with zero or NULL amount.
12. Find out the largest orders of salesman from two value e.g. 1002 and 1007.
13. Count all orders of particular date e.g. October 3, 2023
14. Calculate the total amount ordered.
15. Calculate the average amount ordered.
16. Count the no. of salesmen currently having orders.
17. List all salesmen with their % of commission.
18. Assume each salesperson has a 15% commission. Write a query on the order table that will produce the order number, salesman no and the amount of commission for that order
19. Find the highest rating in each city in the form : For the city (city), the highest rating is : (rating) List all in descending order of rating.
20. Calculate the total of orders for each day and place the result in descending order.
21. Show the name of all customers with their salesman's name.
22. List all customers and salesmen who shared a same city.
23. List all orders with the names of their customer and salesman.
24. List all orders by the customers not located in the same city as their salesman.
25. List all customers serviced by salespeople with commission above 15%.
26. Calculate the amount of the salesman commission on each order by a customer with rating above 100.

27. Find all pairs of customers having the same rating without duplication.
28. List all orders that are greater than the average of October 4,2023.
29. Find the average commission of salesmen in London.
30. Find all orders attributed to salesmen in 'London' using both the subquery and join methods.
31. List the commission of all salesmen serving customers in 'London'.
32. Find all customers whose cnum is e.g. 1000 above than the snum of name e.g. Sejal.
33. Count the no. of customers with the rating above than the average of one city e.g. 'Surat'.
34. Find all salesmen with customers located in their cities using ANY and IN.
35. Find all salesmen for whom there are customers that follow them in alphabetical order.
36. Find all customers having rating greater than any customer in particular city e.g. 'Rajkot'.
37. List all orders that has amount greater than atleat one of the orders from 6th October, 2023.
38. Find all orders with amounts smaller than any amount for a customer in 'London'.
39. Find all the customers who have greater rating than every customer in one city e.g. 'Anand'
40. Create a union of two queries that shows the names, cities and ratings of all customers. Those with rating of >=200 should display 'HIGH RATING' and those with < 200 should display 'LOW RATING'.
41. Produce the name and number of each salesman and each customer with more than one current order in the alphabetical order of names.
42. Create union of three queries. First select snum of all salesman in Surat, second, the cnum of all customers in 'Surat' and third, the onum of all orders of 3rd Oct. Retain duplicates between the last two queries but remove the duplicates between either of them and the first.
43. Remove all orders from customer Chirag from the orders table.
44. Set the ratings of all the customers of Piyush to 400.
45. Increase the rating of all customers in Rome by 100.

Set 4

a) Write a PLSQL block which will print Employee list (Empno and Name) EMP (empno, empnm, empadd, salary, date_birth, joindt, deptno)
b) Write a function that returns total number of incomplete jobs, using table JOB (jobid, type_of_job, status)
c) Write a function which displays the number of items whose weight fall between a given ranges for a particular color using table ITEM (itemno, name, color, weight)
d) Write a procedure to display top five highest paid workers who are specialized in “PAINTING" using table WORKER (workerid, name, wage_per_hour, specialized_in, manager_id)

Set 5

Create the database EXAM and create given tables with all necessary constraints such as primary key, foreign key, unique key, not null and check constraints.
APPLICANT (AID, ANAME, ADDR, ABIRTH_DT)
ENTRANCE_TEST (ETID, ETNAME, MAX_SCORE, CUT_SCORE)

ETEST_CENTRE (ETCID, LOCATION, INCHARGE, CAPACITY)
ETEST_DETAILS (AID, ETID, ETCID, ETEST_DT, SCORE)
(This database is for a common entrance test which is being conducted at a number of centers and can be taken by an applicant on any day except holidays)

Do as directed:

1. Modify the APPLICANT table so that every applicant id has an 'A' before its value. E.g. if value is '1123', it should become 'A1123'.
2. Display test center details where no tests were conducted.
3. 3.Display details about applicants who have the same score as that of Ajaykumar in 'ORACLE FUNDAMENTALS'.
4. Display details of applicants who appeared for all tests.
5. Display those tests where no applicant has failed.
6. Display details of entrance test centers which had full attendance between 1st Oct 15 and 15th Oct 16.
7. Display details of the applicants who scored more than the cut score in the tests they appeared in.
8. Display average and maximum score test wise of tests conducted at Mumbai.
9. Display the number of applicants who have appeared for each test, test center wise.
10. Display details about test centers where no tests have been conducted.
11. For tests, which have been conducted between 2-3-17 and 23-4-17, show details of the tests as well as the test centre.
12. How many applicants appeared in the 'ORACLE FUNDAMENTALS' test at Chennai in the month of February?
13. Display details about applicants who appeared for tests in the same month as the month in which they were born.
14. Display the details about APPLICANTS who have scored the highest in each test, test centre wise.
15. Design a read only view, which has details about applicants and the tests that he has appeared for.
16. Write a procedure which will print maximum score centre wise.
17. Write a procedure which will print details of entrance test showing Centre name, candidate id, date, and score:
18. Write a trigger which do not allow insertion / updation / deletion of Enterance test details on Sunday.

Set 6

EMP (empno, empnm, empadd, salary, date_birth, joindt, deptno)
DEPT (deptno, deptnm)
Write a PL/SQL block (table above EMP-DEPT table) which takes as input Department name and

displays all the employees of this department who has been working since last five years

Set 7

CUSTOMER (cid, fname, lname, city, country, phone)
ORDER (oid, oDate, oNumber, cid, oTotalAmount)

1. List the number of customers in each country. Only include countries with more than 100 customers.
2. List the number of customers in each country, except China, sorted high to low. Only include countries with 5 or more customers.
3. List all customers with average orders between Rs.5000 and Rs.6500.
4. Create a trigger that executes whenever country is updated in CUSTOMER table.
5. Create a function to return customer with maximum orders.
6. Create a procedure to display month names of dates of ORDER table. The month names should be unique.

Set 8

EMPMAST (empno, name, pfno, empbasic, deptno, designation)
DEPT (DNO, DNAME)
Rules: HRA = 15% of basic
DA = 50% of basic
Medical = 100
PF = 8.33%of basic
Print Salary slip. Design your own format

Learning Resources Required: If Any

1) https://onlinecourses.nptel.ac.in/noc24_cs21/preview
2) https://docs.oracle.com/en/database/index.html
3) https://docs.oracle.com/database/121/SQLRF/toc.htm
4) https://dev.mysql.com
5) https://docs.mongodb.com/manual/mongo/

Additional Exercises: If Any

NoSQL Database (Desirable)
Tools: MongoDB

1	Introduction, Installation
2	Create Database, Drop Database
3	Create Collection, show collection

4	Insert document, Query Document, Update document, delete document
5	Projection
6	Limiting rows
7	Export and Import

https://docs.mongodb.com/manual/mongo/

CO- PO Mapping:

Semester 2	Subject Name: Database Management System										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	2	3	2	-	2	-	-	-	-	-	-
CO3	3	3	3	-	3	-	-	-	-	-	-
CO4	3	2	3	-	3	-	-	-	-	-	-
CO5	3	2	2	-	2	3	-	-	-	-	-

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code : BC02001031

Course / Subject Name : Advanced Web Technology

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Minor Elective Subject

Prerequisite:	Web development using HTML, CSS and Javascript & basics of DBMS
Rationale:	• Students will be able to develop modern, complex, responsive and scalable websites. • Understand necessary functionalities and elements of client and server-side development of website.

Course Outcome:

After completion of the course, student will able to:

No.	Course Outcomes	RBT Level*
1	Create dynamic web pages by utilizing PHP's foundational concepts, including basic syntax, variables, form handling, number manipulation, string operations, and control structures, while ensuring proper debugging and error handling.	AP
2	Create dynamic and interactive web pages using arrays, reusable functions, and form handling techniques	AP
3	Manage state and file handling in web applications using cookies, sessions, and file operations	AP
4	Implement interactive and responsive web features using jQuery and AJAX techniques.	AP
5	Build modular and efficient single-page applications using Angular.	AP

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE I	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	**Introduction to PHP** **Introduction**: Basic HTML syntax, Basic PHP Syntax, using SFTP, Testing your script, Sending text to browser, Using the PHP Manual, Sending HTML to the browser, Adding comments to Scripts, Basic debugging steps **Variables**: What Are Variables?, Variable Syntax, Types of Variables, Variable Values, Understanding Quotation Marks **Form**: Creating a Simple Form, Choosing a Form Method, Receiving Form Data in PHP, Displaying Errors, Error Reporting, Manually Sending Data to a Page **Numbers**: Creating the Form, Performing Arithmetic, Formatting Numbers, Understanding Precedence, Incrementing and Decrementing a Number, Creating Random Numbers **Strings**: Creating the HTML Form, Concatenating Strings, Handling Newlines, HTML and PHP, Encoding and Decoding Strings, Finding Substrings, Replacing Parts of a String **Control Structures:** Creating the HTML Form, The if Conditional, Validation Functions, Using else, More Operators, Using elseif The Switch Conditional, The for Loop	**12**	**20**
2	**Working with Arrays, Forms and Functions** **Using Arrays:** What Is an Array?, Creating an Array, Adding Items to an Array, Accessing Array Elements, Creating Multidimensional Arrays, Sorting Arrays, Transforming Between Strings and Arrays, Creating an Array from a Form **Creating Web Applications:** Creating Templates, Using External Files, Using Constants, Working with the Date and Time, Handling HTML, Forms with PHP, Revisited, Making Forms Sticky, Sending Email, Output Buffering, Manipulating HTTP Headers **Creating Functions:** Creating and Using Simple Functions, Creating and Calling Functions that Take Arguments, Setting Default	**8**	**25**

	Argument Values, Creating and Using Functions that Return a Value, Understanding Variable Scope		
3	**Advanced PHP** **Cookies and Sessions:** What Are Cookies?, Creating Cookies, Reading from Cookies, Adding Parameters to a Cookie, Deleting a Cookie, What Are Sessions?, Creating a Session, Accessing Session Variables, Deleting a Session **Files and Directories:** File Permissions, Writing to Files, Locking Files, Reading from Files, Handling File Uploads, Navigating Directories, Creating Directories, Reading Files Incrementally	**12**	**25**
4	**jQuery Basics** Exploring Fundamentals of jQuery, loading and using jQuery, describing call back functions, exploring jQuery Selectors, methods, manipulators, events and effects, exploring jQuery and AJAX	**5**	**15**
5	**Angular:** **Introduction to Angular:** Components, Modules, Selector, Bootstrapping,IDE's and Plugins. **Introduction to Typescript:**Introduction, Types of Typescript-String, Number, Boolean, Array, Enum,Void, Functions and lambdas, Classes and Interface,Decorators.	**7**	**15**
	Total Hours:	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20%	30%	50%	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Textbook:

1. Larry Ullman, PHP for Web, fifth Edition, Pearson
2. Adam Freeman Pro jQuery 2.0, Apress
3. Learning Angular – Third Edition, Aristeidis Bampakos, Pablo Deeleman, Packt
4. Publishing

Reference Books:

1. Julie C Meloni, "Sams Teach Yourself PHP, MySQL and Apache All in One" 4th

edition, Pearson Education
2. Jquery, by Kogent Learning Solutions Inc.
3. Tim Converse and Joyce Park, PHP6 and MySQL Bible –Steve Suehring, Wiley India
4. Luke Welling, Laura Thomson , PHP and MySQL Web Development — Pearson
5. Beginning Ajax with PHP From Novice to Professional, By Lee BabinApress
6. Head First AJAX by Rebecca Riordan , O'Reilly Media
7. Head First PHP& MySQL by Lynn Beighley, Michael Morrison, O'Reilly Media
8. Head First jQuery by Ryan Benedetti and Ronan Cranley, O'Reilly Media
9. Learning jQuery By Jonathon chaffer and Karl Swedberg, O'Reilly Media
10. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, O'Reilly Media, Inc.

Suggested Course Practical List:

1. Write a PHP program to display current date and time and display Good Morning / Good Afternoon / Good Evening message according to current time.
2. Create a web page for user profile and execute a PHP file on submission of the form and display the information using PHP.
3. Write a PHP Program to perform following operation on Array where values in array are entered by user
   a) Print the values of array.
   b) Reverse an array.
   c) Merge two arrays in sorted manner.
   d) Add values of all elements of an array.
4. Write a PHP function
   a) To print your name.
   b) To print the size of a string. Pass string as an argument
   c) To accept variable length arguments and display sum of all values and total number of arguments.
5. Write a PHP program to perform following string operations:
   a) Print your name.
   b) Print the size of a string. Pass string as an argument.
   c) Concat two strings.
   d) convert case of string
   e) Find one string from another.
6. Write a PHP program to find out maximum and minimum number.
7. Create an application to create a cookie, access a cookie and destroy the cookie.
8. Create an application that keeps track of how many times a visitor has loaded the page.
9. Set a session after user's login; maintain the user's data with session. Destroy the session and its data after a period of time.

10. Build an authentication application and restricts the unauthorized user from loading the page. And redirect the page with appropriate message
11. Write PHP code to store image in a database table.
12. Write PHP code to implement Querystring (passing variables using URL) concept.
13. Write PHP code to develop E-mail registration form and store all the submitted data in database table.
14. Write a program to read customer information like Cust_no, Cust_name, Item_purchased and Mob_no from Customer table and display all these information in table format on output screen.
15. Write a program to develop student registrationform and display all the submitted data on another page.
16. Write a program to read Employee informations like Emp_no, Emp_name, Designation and Salary from EMP table and display all these informations in table format on output screen. Provide option for editing and deleting a particular record from database.
17. Write PHP code to upload File/ image.
18. Write PHP code to download Data form Database into Excel, Word and PDF.
19. Develop an application which stores Railway's info with following fields Trainno, code,name, Type,Starting city, Destination city, Flag (W for weekly, D for Daily) Provide the following facilities like:
    a) Search by Starting city
    b) Search by Train Type
    c) List of train by Flag.
20. Write a program to calculate total weekly pay. If the user enters the number of hours worked and selects the hourly rate of pay from a list box. If overtime has been done, the number of hours is also entered. Over time hours are paid at double rate. A check box displays overtime. Calculate total amount to be paid.
21. Develop an application to add the movie name currently running with following operations:
    a) To see all the favorite movie
    b) To view top 5 and 10 movies
22. Create an application which displays the info about a particular institute which enables the user to see the faculty list according to department.
23. Write a PHP program to calculate interest for loan using user defined class 'loan calculator'.
24. Write a program for online merchants with following operations:
    a) Customer login for further transactions
    b) Validates the customer's information
    c) System should protect customer's information
25. Develop an application for a shopping cart with following operations:
    a) Manage and display the catalog
    b) Add, Update and delete the products
    c) Process the shipping info

d) Stores the order info
e) Display the summary

26. Display the most popular item to your customer which is purchased the most? If the item is in top 5 display the description to the customer.
27. Create a database application for social gathering containing
    a) Information about the location (eg: club house, Party venue)
    b) Facilities available in the venue
    c) Booking for the specific events

1) Desirable: List of Practical's: AJAX & jQuery & Angular

1) Create a polling application (Survey) using AJAX and PHP.
2) Create a Suggestion application using AJAX and PHP

CO- PO Mapping:

Semester 2	**Course Name : Advanced Web Technology**										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-
CO5	3	3	3	2	2	-	-	-	-	-	-

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code : BC02001041

Course / Subject Name : Advanced Statistical Methods

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Minor Elective Subject

Prerequisite:	Logical Thinking and Basic Statistical Concepts
Rationale:	The course aims to impart sampling and distribution of data, testing over various populations and perform various operations that leads to decision making.

Course Outcome:

After completion of the course, student will able to:

No.	Course Outcomes	RBT Level*
CO1	Apply sampling and statistical inference methods to estimate population parameters, including the mean, proportion, variance, and sample size, using appropriate statistical techniques.	AP
CO2	Evaluate various statistical hypothesis tests, including those for population means, proportions, and variances, using z and t statistics, and apply appropriate methods to compare two populations through confidence intervals and hypothesis testing, interpreting the results in the context of real-world data.	AN
CO3	Analyze the results of one-way ANOVA and Chi-square tests (goodness of fit and test of independence) to determine patterns, relationships, and significant differences in data sets, and evaluate the appropriate application of each statistical method in real-world scenarios.	AN
CO4	Analyze the application of Tukey's Honestly Significant Difference (HSD) test for multiple comparisons with equal sample sizes and evaluate the regression line equation in simple regression analysis to predict relationships between variables.	AN

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	**Sampling and Sampling Distributions:** Concept of Sampling Sampling Distribution of sample mean Sampling Distribution of sample proportion **Statistical Inference: Estimation for Single Population:** Estimating the population mean using z and t statistic Estimating the population proportion Estimating the population variance Estimating sample size	11	25%
2	**Statistical Inference: Hypothesis Testing for Single Population:** Introduction to Hypothesis Testing Hypothesis Testing about a population mean using z and t statistic Hypothesis Testing about a proportion Hypothesis Testing about a variance	12	25%
3	**Statistical Inferences about Two Populations:** Hypotheses Testing and confidence intervals about the difference in two means using z and t statistic Statistical Inferences for Two related populations Statistical Inferences about two population proportions Hypothesis Testing about two population variances	12	25%
4	**Analysis of Variance:** One-way ANOVA **Analysis of Categorical Data:** Chi-square goodness of fit test Chi-square test of independence	6	15%
5	**Multiple Comparison Tests:** Tukey's Honestly Significant Difference (HSD) Test: The Case of Equal Sample Sizes. **Overview:**	4	10%

	Simple Regression Analysis, Introduction, Determine the Equation of Regression Line		
	Total Hours:	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
-	10	30	60	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Textbook:

Sr No	Author	Name of the Book	Publisher	Year of Edition
1	Ken Black	Business Statistics for Contemporary Decision making	Wiley	10th

Reference Books:

No.	Author	Name of the Book	Publisher	Year of Edition
1	Sanjiv Jaggia, Alison Kelly	Business Statistics	McGraw Hill	Latest
2	Richard I. Levin and David S.Rubin	Statistics for Management	Pearson	Latest
3	D. P. Apte	Statistics for Managers	Excel	Latest
4	Gerald Keller & Hitesh Arora	Business Statistics	Cengage	Latest
5	D. P. Apte	M. S. Excel: Statistical Tools for Managers	Excel	Latest
6	Naval Bajpai	Business Statistics	Pearson	Latest

No	Title
1	Testing of significance and confidence intervals for single proportion and difference of two proportions.

2	Testing of significance and confidence intervals for single mean and difference of two means and paired tests.
3	Testing of significance and confidence intervals for difference of two standard deviations.
4	Sample Tests based on Chi-Square Distribution.
5	Testing if the population variance has a specific value and its confidence intervals.
6	Testing of goodness of fit.
7	Testing of independence of attributes.
8	Testing of significance and confidence intervals of an observed sample correlation Coefficient.
9	Testing confidence intervals of equality of two population variances.
10	Study on Regression Analysis

CO- PO Mapping:

Semester 2	**Advanced Statistical Methods**										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2	1	3	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-
CO4	3	2	2	3	3	-	-	-	-	-	-

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code : BC02001051

Course / Subject Name : Mathematics-2

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Multidisciplinary Course

Prerequisite:	Basic mathematical skills
Rationale:	This course provides a foundational understanding of mathematical logic, relations, and graph theory, which are essential areas of study in computer science, mathematics, and related disciplines. **Mathematical Logic** forms the basis for reasoning and decision-making in computational systems, algorithm design, and programming languages. The study of **statements, connectives, and truth tables** equips students with the tools to analyze and verify logical expressions, which is crucial for building efficient algorithms, error-checking mechanisms, and developing formal proofs. The topics of **tautology, contradiction, equivalence, and normal forms** foster the ability to simplify and manipulate logical statements, making them more computationally feasible and interpretable. The section on **Relations & Ordering** explores the mathematical structures that underlie the relationships between different objects in a set, forming the foundation for database theory, object-oriented programming, and the design of relational systems. Understanding properties like **binary relations, equivalence relations, and partial ordering** prepares students for analyzing data relationships and optimizing search and retrieval operations. These concepts also support the study of **graph theory** by offering methods to categorize and compare sets of data and relationships systematically. **Graph Theory**, an essential tool for modeling networks, structures, and systems, is introduced to students in this course through its various components, such as **nodes, edges, paths, and connectivity**. Topics like **directed and undirected graphs, isomorphic graphs, and reachability** provide students with the skills to represent and solve real-world problems, such as transportation networks, social networks, and communication systems. Additionally, concepts of **graph connectivity** and **path finding** are crucial in algorithmic design, particularly in areas like network routing, graph traversal, and optimization. This course builds logical thinking, analytical skills, and problem-solving abilities that are central to computer science, ensuring students are well-prepared for more advanced topics in algorithms, data structures, artificial intelligence, and software

	engineering. By mastering these foundational concepts, students will be equipped to address complex computational challenges and contribute to innovations in various technical fields.

Course Outcome:

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

No	Course Outcomes	RBT Level*
1	**Apply** principles of mathematical logic to design and optimize algorithms by constructing and simplifying logical expressions, using truth tables, normal forms, and logical connectives to verify correctness and prove equivalence.	AP
2	**Apply** concepts of relations and ordering to model and analyze real-world systems by using relation matrices, graphs, and partitioning techniques to represent binary relations, equivalence relations, and partial orderings in problem-solving and data organization tasks.	AP
3	**Apply** combinatorial techniques, including counting principles, permutations, combinations, the pigeonhole principle, and binomial coefficients, to solve complex problems in probability, optimization, and algorithm design.	AP
4	**Apply** graph theory concepts, such as directed and undirected graphs, paths, cycles, and connectivity, to model and solve problems in network analysis, resource optimization, and route planning, utilizing graph representations to analyze relationships and determine efficient solutions in real-world systems.	AP

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	0	4	70	30	-	-	100

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	**Mathematical Logic** ➢ Statements and Notation ➢ Connectives (Negation, Conjunction, Disjunction) ➢ Statement Formulas and Truth Table ➢ Conditional and Biconditional statement; Tautology and contradiction	11	25%

	➢ Equivalence Formulas ➢ Duality ➢ Normal Forms		
2	**Relation & Ordering** ➢ Relations ➢ Properties of Binary Relations in a set ➢ Relation Matrix and Graph of a Relation ➢ Partition and Covering of a Set ➢ Equivalence Relations ➢ Compatibility Relations ➢ Partial ordering ➢ Partially ordered set: Representation and Associated Terminologies	11	25%
3	**Combinatorics** ➢ The Basic Counting Principles ➢ Permutations and Combinations ➢ Pigeonhole Principle ➢ Binomial Coefficient ➢ Discrete Probability	11	25%
4	**Graph Theory:** ➢ Basic Concepts of Graph Theory; Initial Terminal nodes; Adjacent nodes; Directed edge; Undirected Edge; Directed Graph (Digraph), Undirected Graph; Mixed Graph; Loop; Distinct Edges; Parallel Edges; Multi Graph; Simple Graph; Weighted Graph; Isolated Nodes; Pendent Nodes; Null Graph; Isomorphic Graphs; In-degree, Out-degree, Total-degree; Sub graph. ➢ Paths, Length of a Path of a graph; Simple Path; Elementary Path; Cycle(circuit); Simple Cycle; Elementary cycle; Path of Minimum Length (Geodesic); Distance between two nodes; Reachability; Reachable set of a Node; Connected Graph; Strongly, Unilaterally, Weakly Connected Graph & Components	12	25%
	Total Hours:	**45**	**100%**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**

20%	**30%**	**50%**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Textbook:

Sr No.	Book Title	Edition	Publisher	Author(s)
1.	Discrete Mathematical Structures with Applications to Computer Science	Latest	Tata McGraw Hill	J.P. Trembly; R. Manohar
2.	Discrete Mathematics	Latest	Cengage Learning	D. S. Malik; M.K. Sen

Reference Books:

Sr No.	Book Title	Edition	Publisher	Author(s)
1.	A textbook of Discrete Mathematics	Latest	S. Chand Publication	Swapan Kumar Sarkar
2.	Discrete Mathematics	Latest	Oxford University Press	Swapan Kumar Chakraborty; Bikas Kanti Sarkar

CO- PO Mapping:

Semester 2	**Subject Name: Mathematics-2**										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1	-	-	1	-	-	-	-	-	-
CO2	3	1	-	-	1	-	-	-	-	-	-
CO3	3	1	-	-	1	-	-	-	-	-	-
CO4	3	1	-	-	1	-	-	-	-	-	-

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code : BC02001061

Course / Subject Name : Data Analytics using Spread Sheet

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Skill Enhancement Courses

Prerequisite:	Basic Excel Skill
Rationale:	Data analytics using spreadsheet lies in its accessibility, versatility, and cost-effectiveness, enabling users to conduct data analytics tasks efficiently and effectively across industries and applications.

Course Outcome:

After completion of the course, student will able to:

No.	Course Outcomes	RBT Level*
1	Perform data organization techniques and navigate the excel interface for entering and copying formulas.	AP
2	Use basic excel functions such as count, sum, date time functions, text functions, and advanced Excel functions such as various LOOKUP functionality.	AP
3	Apply fundamental mathematical, statistical and financial functions on data.	AP
4	Create and interpret data visualizations for various charts using chart wizard and pivot tables.	AP
5	Automate complex tasks by creating and executing macros and design custom functions in VBA.	AP

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
0	0	4	2	0	0	50	50	100

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	**Introduction to Data Analysis & Creating Formulas:**	07	15%

	Sorting, Filter, Text to Column, Data Validation, Splitting the Screen, Freezing Panes, Entering and copying formula, use of arithmetic: Ratios & Proportions, algebraic, trigonometric and statistical functions in excel, use of different forms IF condition, NESTED IF condition etc., What-if- Analysis, Goal Seek.		
2	**Working with Functions in MS-Excel-1:** **Count and Sum:** Countif, Count Blank/Nonblank Cells, Count Characters, Not Equal To, Count Cells with Text, Sum, Running Total, Sumif, **Date & Time:** DateDif, Today's Date, Date and Time Formats, Calculate Age, Time Difference, Weekdays, Days until Birthday, Add or Subtract Time, Day of the Year. **Text:** Separate Strings, Count Words, Text to Columns, Find, Change Case, Remove Spaces, Compare Text, Substitute vs Replace, Concatenate, Substring. **Lookup & Reference:** Vlookup, Index and Match, Two-way Lookup, Offset, Case-sensitive Lookup, Left Lookup, Locate Maximum Value. Indirect, Two column Lookup, Closest Match.	**11**	**25%**
3	**Working with Functions in MS-Excel-2:** **Financial Functions:** Future Value (FV), FVSCHEDULE, Present Value (PV), Net Present, Value (NPV), PMT, Internal Rate of Return (IRR), NPER, EFFECT. **Mathematical Functions:** ROUND, COUNT, COUNIF, MIN, MAX, ROUND, SQRT. **Statistical Functions:** AVERAGE, MEAN, MEDIAN, MOD, STDEV, VAR, RSQ, DEVSQ, COVAR.	**11**	**25%**
4	**Data Visualization:** Using Chart wizard: Creating various types - pie, column, bar, area etc., Generating Histogram, Frequency Curve and Polygon, Time series graphs, Inserting bit map objects, word Art. Pivot Table: Creating pivot-table, creating pivot charts, inserting pictures, clipart shapes, and smart arts.	**09**	**20%**
5	**Macro and VBA in MS-Excel:** Use a macro, record a macro, assign a macro, run a macro, store a macro, use relative references, Create a basic calculator with VBA in Excel. Write some code in VBA (Visual Basic for Application) to manipulate records in Excel spreadsheet and work with VBA user form to build graphic user interface application.	**07**	**15%**
	Total Hours:	**45**	**100%**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20%	**30%**	**50%**	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Textbook:

1. Walkenbach J., "Microsoft Excel 2016 Bible: The Comprehensive Tutorial Resource", Wiley.

Reference Books:

1. Mark Doge and Craig Stinson, "Microsoft Excel Latest Version Inside Out", PHI Learning Private Limited, New Delhi – 110001.
2. Winston, "Microsoft Excel 2013: Data Analysis and Business Modeling", PHI
3. Bernd Held, "Excel Functions and Formulas", BPB Publications.

CO- PO Mapping:

Semester 2	**Course Name : Data Analytics using Spread Sheet**										
	POs										
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11
CO1	3	3	3	-	3	-	-	-	2	-	2
CO2	3	3	3	-	3	-	-	-	2	-	2
CO3	3	3	3	-	3	-	-	-	2	-	2
CO4	3	3	3	-	3	-	-	-	2	-	2
CO5	3	3	3	-	3	-	-	-	2	-	2

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

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GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications
Level: Under Graduate
Course / Subject Code : BC02001081
Course / Subject Name : Professional Ethics

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Value Added Courses

Prerequisite:	Basic Excel Skill
Rationale:	Data analytics using spreadsheet lies in its accessibility, versatility, and cost-effectiveness, enabling users to conduct data analytics tasks efficiently and effectively across industries and applications.

Course Outcome:

After completion of the course, student will able to:

No.	Course Outcomes	RBT Level*
1	Discuss general concepts related to moral, law, and professional ethics	UN
2	Discuss ethical aspects related to computing and information technology.	UN
3	Discuss societal aspects related to computing and information technology	UN
4	Discuss the impact of new technological development on society and ethics	UN

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	0	2	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	History of Computing: Evolution of computing and information technology, internet, World Wide Web; Emergence of social and ethical problems in computing, Need of computer ethics education	1	5%

2	Morality and the law: Morality, law, etiquettes and manners	2	5%
3	Ethics and Ethical Analysis: Definition, Ethical Theories, Functional definition of ethics, Ethical reasoning and decision making, Codes of ethics, Reflection on Computer Ethics, Technology and Values	2	5%
4	Ethics and the Profession: Evolution of Professions, Ethical Professions – education and licensing, Professional decision making and ethics, Professionalism and ethical responsibilities	3	10%
5	Anonymity, Security, Privacy, and Civil Liberties: Anonymity, Security, Privacy, Ethical and legal framework for information	3	10%
6	Intellectual Property Rights (IPR) and Computer Technology: Definition, Computer products and services; Foundation of Intellectual Property (IP); Ownership; IP crimes, Protection of ownership rights; Protecting computer software under the IP; Transnational issues and IP	3	10%
7	Social Context of Computing: The digital divide; Obstacles to overcoming digital divide; ICT in the workplace; Employee monitoring; Workplace, Employee, Health and Productivity	3	10%
8	Software Issues – Risks and Liabilities: Definitions; Causes of software failures; Risk; Consumer protection; Improving software quality; Producer protection	3	10%
9	Computer Crimes: History of computer crimes; Types of computer system attacks; Motives of computer crimes; Costs and social consequences; Computer crime prevention strategies	3	10%
10	New Frontiers of Computer Ethics – Artificial Intelligence; Virtualization and Virtual reality; Cyberspace	4	15%
11	Cyberbullying: Definition; Types of cyberbullying; Areas of society affected by cyberbullying; Legislation against cyberbullying; Effect of cyberbullying; Dealing with cyberbullying	3	10%
	Total Hours:	**30**	**100%**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	S Level
25	75	0	0	0	0

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
(a) Textbook:

1. Ethical and Social Issues in Information Age (6th Edition) by Joseph Migga Kizza, Springer Publication, Texts in Computer Science
2. ACM Code of Ethics and Professional Conduct available at https://ethics.acm.org/

Reference Books:

1. Engineering Ethics for a Globalized World by Collen Murphy, Paolo Gadoni, Hassan Bashir, Jr. Charles E. Harris, and Eyad Masad; Springer Publication
2. Engineering Ethics: Concepts and Cases (6th Edition) by Jr. Charles E. Harris, Michael S. Pritchard, Ray W. James, Elaine E. Englehardt, Michael J. Rabins; Cengage Publishing

CO- PO Mapping:
*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

Semester 2	Subject Name: Professional Ethics										
	POs										
Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1
CO1	-	-	-	-	-	3	3	-	-	3	1
CO2	-	-	-	-	-	3	3	-	-	1	1
CO3	-	-	-	-	-	3	3	-	-	3	1
CO4	-	-	-	-	-	3	3	-	-	3	1

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