Structure & Syllabus for Semester-IV

BACHELOR OF COMPUTER APPLICATIONS (BCA) Programme

Gujarat University

2024 - 2025

As per NEP 2020 CURRICULUM AND CREDIT FRAMEWORK FOR UNDERGRADUATE PROGRAMMES, UGC

&

Resolution No. KCG/admin/2023-24/0607/kh.1

of

Education Department, Govt. of Gujarat

STRUCTURE FOR SEMESTER – 4
GUJARAT UNIVERSITY
Bachelor Of Computer Applications (B.C.A.)
(as per NEP 2020)

COURSE:	**Bachelor Of Computer Applications (B.C.A.)**
MAJOR:	**COMPUTER APPLICATIONS**

SEMESTER - 4

MAJOR

CODE	COURSE	CREDITS
DSC-C-BCA-241T	Software Engineering	4
DSC-C-BCA-242T	Database Management Concepts	4
DSC-C-BCA-243P	Structured Query language Using SQL Plus	4

MINOR

CODE	COURSE	CREDITS
DSC-M-BCA-244T	Principles of Web Application Development	2
DSC-M-BCA-245P	Web Application Development using ASP.net – C#	2
	OR	
DSC-M-BCA-244T	Computer Oriented Numerical Methods	2
DSC-M-BCA-245P	Computer Oriented Numerical Methods practical	2
	OR	
DSC-M-BCA-244T	Web Security	2
DSC-M-BCA-245P	Web Penetration Testing using DVWA and Wireshark	2

ABILITY ENHANCEMENT COURSE ()

AEC-BCA-245	(Any ONE Course to be selected from the Basket)	**2**

SKILL ENHANCEMENT COURSE
(Any ONE Course. Course can also be chosen from Basket)

SEC-BCA-246	Software Testing Automation	**2**
SEC-BCA-246	Business Intelligence using applications of Power BI	**2**
SEC-BCA-246	Programming with RUBY	**2**

COMMON VALUE ADDED COURSES

VAC-BCA-247	(Any ONE Course to be selected from the Basket)	**2**

TOTAL CREDITS 22

Semester – IV

BACHELOR OF COMPUTER APPLICATIONS

MAJOR : COMPUTER APPLICATION

Course Name: Software Engineering

Course Code: DSC-C-BCA-241T

Credits: 4

Course Outcomes:
To understand the concepts of software Engineering
To understand how to Select and apply Appropriate Process
To understand how to manage user's Requirement
To understand how to Analyse, Design, Build and test software
To understand Software Quality Assurance.

Content

Unit I	Introduction to Software Engineering & Process Models Software Engineering, Software Process Process Models – Waterfall, Incremental, Evolutionary Process Model – Prototype, Spiral and concurrent Development Model Agile Process; Extreme Programming (XP); Brief Overview of Other Agile Process Models: Adaptive Software Development, Scrum	15 Hrs	1 Credit
Unit II	Design Concepts Design Concepts, Design Model; Architectural Styles, Architectural Design, Assessing Alternative architectural Designs, Architectural mapping Using Data Flow User Interface Design: Golden Rules of User Interface Design; User Interface Analysis and Design; Interface Analysis; Interface Design steps	15 Hrs	1 Credit
Unit III	Software Testing Software; Test Strategies for Object Oriented Software; Test Strategies for Web Apps; System Testing; Debugging; Software Testing Fundamentals; Unit Testing,, White-Box Testing; Basic Path Testing; Control Structure Testing; Black-Box Testing;	15 Hrs	1 Credit
Unit IV	Software Quality Assurance Elements of Software quality assurance SWA Task Goals, Formal approach to SQA Software reliability The ISO 9000 Quality standards	15 Hrs	1 Credit

Suggested Reference Book
Software engineering , A practitioner's approach , Roger S Pressman, 7th Edition

Beginning Software Engineering by Rods Stephen, WROX

Course Name: Database Management Concepts

Course Code: DSC-C-BCA-242 T

Credits: 4

Course Outcomes:

The aim of the course is to enable students to:

- Understand about the concepts of database and its usage.
- Understand different database commands to retrieve information
- Know elements of database for real life applications.

Prerequisites:

Nil

Contents:

Unit No.	Particulars	Hours	Credits
1.	**Unit Title: Beginning Structure Query Language**	15	01

Introduction to SQL, Data Definitions Commands – SQL data types, Creating table structure, SQL constraints,

Data Manipulation Commands - Adding table rows, Saving table changes, Listing table rows, Updating Table rows, Restoring table contents, Deleting table rows,

Select Queries - Selecting rows with conditional restrictions, Arithmetic operators, Logical operators, Special Operators,

Additional Data Definition Commands -Changing column's data type and characteristics, Adding a column, Dropping a column, Advanced data updates, Adding Primary and foreign key designations, Deleting a table from a database

Additional Select query keywords- Ordering a listing, Listing unique values, Aggregate functions, Grouping data

2.	**Unit Title: Advanced SQL**	**15**	**01**

SQL Set Operators – UNION, INTERSECT, MINUS, UNION ALL

SQL Join Operators – Cross join, Natural Join, Join USING Clause, Join ON Clause, Outer Joins

SQL Functions – Date and Time Functions, Numeric Functions, String Functions, Conversion Functions

Sub queries and Correlated queries – WHERE , IN, FROM, Attribute List, Multirow subquery (ANY, ALL)

Virtual Tables – Creating a View, Display View, Oracle Sequences

Procedural SQL – Creating procedure, Display procedure data

3.	**Unit Title: Managing Transaction and Concurrency**	**15**	**1**

What is a transaction – ACID properties, The Transaction Log

Concurrency Control – Lost Update, Uncommitted Data, Inconsistent retrievals, The Scheduler

Concurrency Control with Locking methods – Lock Granularity, Lock Types, Two-phase Locking, Deadlocks

Concurrency control with Timestamping methods – Wait-Die and Wound/wait Schemes

Concurrency control with Optimistic methods

Database Recovery Management – Transaction Recovery

4.	**Unit Title: Distributed Databases**	**15**	**01**

The Evolution of DDBMS , Advantages and Disadvantages of DDBMS
Distributed Processing and Distributed Databases

Levels of Process and data distribution – Single site processing single site data, Multiple site processing single site data, Multiple site processing multiple site data

Distributed database Transparency Features, Distribution Transparency

Transaction Transparency – Distributed Request and Distributed transaction, Distributed Concurrency Control, Two-phase commit protocol

Performance and failure transparency

Textbook:

1. Database System Concepts – 10th Edition
   Publisher: Cengage Learning
   By Peter Rob and Carlos Coronel

References:

1. Introduction to Database Management Systems (First Edition 2006)
   Publisher: Tata McGraw-Hill By ISRD Group

2. An Introduction to Database Systems (Eighth Edition 2006)
   Publisher : Pearson By C. J. Date, A. Kannan & S. Swamynathan

3. An Introduction to Database Systems
   Publisher: Pearson By ITL Education Solutions Limited

Accomplishments of the student after completing the Course:

After completion of this course, students will be able to

- Recognize components of database in real life applications.
- Familiar with the advanced database concepts such as Distributed Database.
- Decide how to store and retrieve information effectively using advanced database concepts.

Course Name: Structured Query Language Using SQL+

Course Code: DSC-C-BCA-243 P

Credits: 4

Course Outcomes:

The aim of the course is to enable students to:

- Understand about the concepts of database and its usage.
- Understand different database commands to retrieve information
- Know elements of database for real life applications.

Prerequisites:

Nil

Contents:

Unit No.	Particulars	Hours	Credits
1.	**Unit Title: Introduction to SQL and SQL*Plus**	30	01

Overview of SQL: Definition, importance, and applications in database management.

Introduction to SQL*Plus: Understanding its role as an interactive tool for executing SQL commands and scripts.

Basic SQL Commands: Introduction to basic SQL commands such as SELECT, INSERT, UPDATE, DELETE for querying, inserting, updating, and deleting data in a database.

Creating and Dropping Tables: Syntax and usage of CREATE TABLE and DROP TABLE commands to create and remove database tables.

Data Types: Understanding SQL data types and their significance in defining table structures.

Constraints: Introduction to constraints (e.g., NOT NULL, UNIQUE, FOREIGN KEY) and their role in enforcing data integrity.

2.	**Unit Title: Querying Data with SQL**	**30**	**01**

Retrieving Data with SELECT: Detailed exploration of the SELECT statement for retrieving data from tables.

Filtering Data: Using the WHERE clause to filter rows based on specified conditions.

Sorting and Ordering: Employing the ORDER BY clause to sort query results in ascending or descending order.

Aggregating Data: Introduction to aggregate functions (e.g., SUM, AVG, COUNT) for summarizing data and generating aggregated results.

Grouping Data: Utilizing the GROUP BY clause to group query results based on specified columns.

3.	**Unit Title: Modifying Data with SQL**	**30**	**1**

Inserting Data: Using the INSERT INTO statement to add new records into a table.

Updating Data: Employing the UPDATE statement to modify existing records in a table.

Deleting Data: Using the DELETE statement to remove records from a table.

Transactions: Introduction to transaction management using COMMIT, ROLLBACK, and SAVEPOINT commands to ensure data consistency and integrity.

Handling Null Values: Understanding how to handle null values in SQL queries and data manipulation operations.

4.	**Unit Title: Advanced SQL Concepts**	**30**	**01**

Set Operators: Understanding different types of set operations (e.g. UNION, INTERSECT, MINUS, UNION ALL) to retrieve data from multiple tables.

Joins: Understanding different types of joins (e.g., INNER JOIN, LEFT JOIN, RIGHT JOIN) to retrieve data from multiple related tables.

Subqueries: Exploring subqueries and their applications in constructing complex SQL queries.

Views: Creating and managing views to simplify query execution and enhance data security.

Practical Exercise:

1: Apply necessary constraints on columns

CUST(CID,CNAME,CCITY,DOB)
PROD(PID,PNAME,PCOST,PPROFIT)
SALE_DETAIL(CID,PID,SALE,SALE_DATE)

Insert minimum 5 Records in each table

1) City must be Ahmedabad, Surat and Baroda
2) Display the Name of customers who are born in 1995.
3) Display the name of product starts with “s”.
4) Display details of product having maximum sales.
5) Update all PPROFIT of product to 3000 where PCOST is greater than 6000.

2: Apply necessary constraints on columns

BRANCH_MASTER(B_NO,B_NAME,LOCATION)
CUSTOMER_MASTER(C_NO,C_NAME,GENDER,DOB,CITY,CONTACT_NO)
ACCOUNT_MASTER(ACC_NO,ACC_TYPE,B_NO,C_NO,OPEN_DATE,CURR_ BALANCE)

Insert minimum 5 Records in each table

1) CURR_BALANCE should not be less than 1000.
2) Display details of male customers only.
3) Display the details of account opened in 1999.
4) List all records where current balance not less than 4000.
5) List all branch names where branch number is 1 or 3.

3: Apply necessary constraints on columns

EMP(EMP_NO,EMP_NAME,DESIGNATION,MGR_NO,HIREDATE,SALARY, COMMISSION,DEPT_NO)
DEPT(DEPT_NO,DEPT_NAME,LOCATION)

Insert minimum 5 Records in each table

1) DEPT_NAME must be HR, FINANCE, PURCHASE, PRODUCTION and SALES.
2) List DEPTNO as DEPARTMENT NUMBER, Count of Employees as “Number of Employees”FROM Employee table.
3) List all employees who earn more than the average salary of their departments.
4) List DEPTNO, sum of salary department wise of employees who earn more than 2000.
5) Create a view on all the employee details of deptno=10.

4: Apply necessary constraints on columns

PERSON (P_ID, LASTNAME, FIRSTNAME, ADDRESS, CITY)
ORDER (O_ID, ORDERNO, P_ID, ORDER_PRICE)

Insert minimum 5 Records in each table

1) Add new Column ORDER_DATE in ORDER table.
2) List all persons where city is Ahmedabad and Rajkot
3) Delete only the records with NULL values in the "Address" column
4) Display all orders where price is between 5000 and 9000.
5) Display details of person based on ORDER_DATE

5: Apply necessary constraints on columns
PROGRAMMER (NAME,DOB,DOJ,PROF1,PROF2,SALARY)
SOFTWARE (SOFTWARE_NAME,DEV_IN,SCOST, LICENCE_EXPIRY_DATE)
STUDIES (INSTITUTE_NAME, LOCATION, COURSE, CCOST)
Insert minimum 5 Records in each table
1) How many institutes provides PGDCA course.
2) Display the institute names from the Studies table without Duplicates.
3) Display details of software having maximum scost.
4) Display the names of the programmers whose names contain 2 Occurrences of the letter "A":
5) Create a view on all the software details which are developed in JAVA.

Desirable Practical Exercise:

Practical Exercise 1:

Table: **Students**

StudentID	Name	Age	City
1	Rahul	20	Delhi
2	Priya	22	Mumbai
3	Alok	21	Bangalore
4	Neha	19	Kolkata
5	Suresh	23	Chennai

Table: **Courses**

CourseID	CourseName	Credits
101	Mathematics	4
102	Science	3
103	History	3
104	English	4
105	Geography	3

Table: **Enrollments**

EnrollmentID	StudentID	CourseID
1	1	101
2	2	102
3	3	103
4	4	104
5	5	105

Queries:

1. Retrieve the names of all students who are from Delhi.
2. List the courses with their corresponding credits.
3. Display the names and ages of students who are older than 20 years.
4. Show the details of courses taken by students named Priya.
5. Count the number of students enrolled in each course.
6. Find the total number of credits for all courses.

7. Display the student names and the courses they are enrolled in.
8. Find the student(s) who are enrolled in the course 'Mathematics'.
9. List the courses along with the number of students enrolled in each course.
10. Show the student names, course names, and cities of all students along with the corresponding course names they are enrolled in.

Practical Exercise 2:

Table: **Doctors**

DoctorID	Name	Specialization	Department
1	Dr. Gupta	Cardiology	Cardiology
2	Dr. Sharma	Orthopedics	Orthopedics
3	Dr. Singh	Pediatrics	Pediatrics
4	Dr. Patel	Gynecology	Gynecology
5	Dr. Khan	Neurology	Neurology

Table: **Patients**

PatientID	Name	Age	Gender	AdmissionDate	DoctorID
101	Ramesh	45	Male	2024-04-15	1
102	Sita	32	Female	2024-03-20	2
103	Mohan	20	Male	2024-04-01	3
104	Radha	28	Female	2024-04-10	4
105	Priya	55	Female	2024-03-25	5

Table: **Appointments**

AppointmentID	PatientID	DoctorID	AppointmentDate	Time
1	101	1	2024-05-05	10:00
2	102	2	2024-05-06	11:00
3	103	3	2024-05-07	12:00
4	104	4	2024-05-08	13:00
5	105	5	2024-05-09	14:00

Queries:

1. Retrieve the names of all patients who have appointments scheduled.
2. List the names of patients along with their assigned doctors.
3. Display the names of doctors and their respective departments.
4. Show the count of appointments scheduled for each doctor.
5. Find the total number of patients admitted to the hospital.
6. List the names of patients who have appointments with Dr. Gupta.
7. Display the names of patients along with their admission dates.
8. Show the average age of patients admitted to the hospital.
9. List the names of patients along with the date and time of their appointments.
10. Display the names of doctors along with the number of appointments they have scheduled.

Practical Exercise 3:

Table: **Books**

BookID	Title	Author	Genre
1	The Guide	R.K. Narayan	Fiction
2	The Immortals	Amish	Fantasy
3	The White Tiger	Aravind Adiga	Fiction
4	Train to Pakistan	Khushwant Singh	Historical
5	My Experiments with Truth	Mahatma Gandhi	Autobiography

Table: **Members**

MemberID	Name	Age	City
101	Rahul	20	Delhi
102	Priya	22	Mumbai
103	Alok	21	Bangalore
104	Neha	19	Kolkata
105	Suresh	23	Chennai

Table: **Borrowings**

BorrowingID	MemberID	BookID	BorrowDate	ReturnDate
1	101	1	2024-04-01	2024-04-15
2	102	3	2024-04-05	2024-04-20
3	103	2	2024-04-10	2024-04-25
4	104	4	2024-04-15	2024-04-30
5	105	5	2024-04-20	2024-05-05

Queries:

1. Retrieve the titles of all books borrowed by the member named Priya.
2. List the names of all members who have borrowed books.
3. Display the titles of all books borrowed on or after April 10, 2024.
4. Count the total number of books borrowed by each member.
5. Find the names of members who have not borrowed any books.
6. Show the titles of books along with the names of members who have borrowed them.
7. Display the number of books borrowed from each genre.
8. Find the average age of members who have borrowed books.
9. List the titles of books along with the number of times each book has been borrowed.
10. Show the member names along with the total number of books each member has borrowed.

Textbook:

1. Database System Concepts – 10th Edition
   Publisher: Cengage Learning
   By Peter Rob and Carlos Coronel

References:

1. Introduction to Database Management Systems (First Edition 2006)
   Publisher: Tata McGraw-Hill By ISRD Group

2. An Introduction to Database Systems (Eighth Edition 2006)
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Accomplishments of the student after completing the Course:

After completion of this course, students will be able to

- Recognize components of database in real life applications.
- Familiar with the advanced database concepts such as Distributed Database.
- Decide how to store and retrieve information effectively using advanced database concepts.

Structure & Syllabus for Semester-IV

BACHELOR OF COMPUTER APPLICATIONS (BCA) Programme

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Education Department, Govt. of Gujarat

STRUCTURE FOR SEMESTER – 4
GUJARAT UNIVERSITY
Bachelor Of Computer Applications (B.C.A.)
(as per NEP 2020)

COURSE:	**Bachelor Of Computer Applications (B.C.A.)**
MAJOR:	**COMPUTER APPLICATIONS**

SEMESTER - 4

MAJOR		
CODE	**COURSE**	**CREDITS**
DSC-C-BCA-241T	Software Engineering	4
DSC-C-BCA-242T	Database Management Concepts	4
DSC-C-BCA-243P	Structured Query language Using SQL Plus	4
MINOR		
CODE	**COURSE**	**CREDITS**
DSC-M-BCA-244T	Principles of Web Application Development	2
DSC-M-BCA-245P	Web Application Development using ASP.net – C#	2
	OR	
DSC-M-BCA-244T	Computer Oriented Numerical Methods	2
DSC-M-BCA-245P	Computer Oriented Numerical Methods practical	2
	OR	
DSC-M-BCA-244T	Web Security	2
DSC-M-BCA-245P	Web Penetration Testing using DVWA and Wireshark	2
ABILITY ENHANCEMENT COURSE ()		
AEC-BCA-245	(Any ONE Course to be selected from the Basket)	**2**
SKILL ENHANCEMENT COURSE **(Any ONE Course. Course can also be chosen from Basket)**		
SEC-BCA-246	Software Testing Automation	**2**
SEC-BCA-246	Business Intelligence using applications of Power BI	**2**
SEC-BCA-246	Programming with RUBY	**2**
COMMON VALUE ADDED COURSES		
VAC-BCA-247	(Any ONE Course to be selected from the Basket)	**2**
	TOTAL CREDITS	**22**

Semester – IV

BACHELOR OF COMPUTER APPLICATIONS

MINORS

1. COGNITIVE MATHEMATICS (CG)
2. DATA SECURITY (DS)
3. WEB TECHNOLOGIES (WTECH)

Course Name: Principles of Web Application Development

Course Code: DSC-M-BCA-244 T

Credits: 2

Course Outcomes:

The aim of this course is to enable students:

- To provide knowledge of advance concepts of dynamic and interactive web application using ASP.NET and C#.NET as language.
- To learn fundamentals of .net framework
- To enrich knowledge about Windows Forms, Controls and ASP.NET based applications.
- To acquire skills to create web-based applications using data controls.

Prerequisites:

- Microsoft Visual Studio 2010
- Any Browser

Contents:

Unit No.	Particulars	Hours	Credits
1.	**Unit Title: Introduction to .Net Framework, Working with ASP.NET, Various Controls, Information Passing Methods** **Introduction to .NET Framework:** Introduction to .NET, ASP.NET, IIS, FCL and CLR, Features of ASP.NET **Working with ASP.NET :** Coding Models (Inline and Code-behind), Built-in directory structure(App_Data, App_code, Bin), Application Configuration Files (Global.asax, Web.config), **Webserver Controls:** Label, Textbox (AutoComplete, Columns, Maxlength, TextMode, Readonly), Types of Button controls (Button, ImageButton, LinkButton), CheckBox, Radiobutton, CheckBoxList, RadiobuttonList, and Dropdownlist **Information passing methods:** Querystring, Cookies, Session and Application Variables.	15	01
2.	**Unit Title: Master page, Navigation, Validation, Login controls, Data Controls** **Master Page**: Introduction to Master Page, Features of Master Page. **Navigation controls :** Treeview, Menu, SiteMapPath, **Validation Controls :** Required Field Validator , Range validator , Regular Expression validator , Compare validator, Custom validator, Validation summary **Login Controls :** Introduction to Login control, LoginView, LoginName, LoginStatus **ADO.NET : Working with database & Data Controls:** Creating own database & tables, Connection (Properties (Connectionstring, state), Method (Open and Close), Command (Methods (ExecuteNonQuery, ExecuteReader, ExecuteScalar), DataAdapter(Methods (Fill)) and DataReader. **Introduction to Authorization and Authentication:** About Authorization and Authentication. **Data Controls:** Introduction of Gridview, DataList, Formview, DetailsView & Repeater.	15	01

Text Book/s:

1. Professional ASP.NET 3.5 (Sp1) In C# and VB by Bill Evjen, Scot Hanselman and David Rader (Wrox)

References:

1. ASP.NET 4 UNLEASED by Stephen Walther (Pearson)

E-Resources:

1. https://www.javatpoint.com/asp-net-tutorial
2. https://www.tutorialspoint.com/asp.net/index.htm
3. https://www.youtube.com/watch?v=3AYoipyqOkQ&list=PL6n9fhu94yhXQS_p1i-HLIftB9Y7Vnxlo

Accomplishments of the student after completing the Course:

After completion of this course, students will be able to

- Understand server-side technology and use of webserver.
- Understand different web server controls available in ASP.NET.
- Mange security and personalization in ASP.NET website.
- Validate different kind of data, and design master page.
- Design GUI enabled interface using data controls to manage database.

Course Name: Web Application Development using ASP.NET - C#

Course Code: DSC-M-BCA-245 P

Credits: 2

Course Outcomes:

The aim of this course is to enable students:

- To provide knowledge of advance concepts of dynamic and interactive web application using ASP.NET and C#.NET as language.
- To learn fundamentals of .net framework
- To enrich knowledge about Windows Forms, Controls and ASP.NET based applications.
- To acquire skills to create web-based applications using data controls.

Prerequisites:

- Microsoft Visual Studio 2010
- MS Access / MYSQL
- Any Browser

Contents:

Unit No.	Particulars	Hours	Credits
1.	**Unit Title: Introduction to .Net Framework, Working with ASP.NET, Various Controls, Information Passing Methods**	15	01

1. Create a form which takes user name in TextBox control. On the click event of the button, name of the user and current date & time will be displayed on the title bar of the web page. (Using Literal control). Also show the use of CSS property to change the text color of a button control using internal and external CSS.
2. Take two linkbuttons showing 'New Member' and 'Existing Member'. When user clicks on the 'New Member' link button panel1 becomes visible, having user name, password, confirm password and email, city as inputs. When user clicks on 'Existing Member' link button then only panel2 becomes visible having user name and password as inputs. Set proper property of the textbox to mask the password. When user inputs in Existing Member matches with user name="Root" and password="abcd123" then print "Gujarat University" for 5 times, each in a new row with increasing font size by 1 each time. (Using code render

block). Else display "Invalid user / password".

3. Design a class file with two methods as sum and subtraction which takes two arguments. Design a web page to take two integer numbers from the user. When user clicks on sum or subtraction button, display the result of two entered values in the label control placed on the web page. (Use of App_code & Bin directory).
4. Create a RadioButtonList that displays the names of some colors in two columns. Add a button to the web form which when clicked changes the background color of the form to the color selected from the list. Also show the use of external CSS file.
5. Create a web page having checkboxlist control shows different products. Web page should have a button and a label. On the click event of the button shows the message "Thank You for placing the order of following items" and then list of all products selected by the user from the checkboxlist server control. Each selected product should be displayed in the new line.
6. Accept Item No, Item Name, Item Price, Item Quantity. Store information in cookie. Display stored information in next page with Total Price = Price * Quantity.
7. Take single image having 3 rectangle shapes horizontally having text "Home", "Product" and "Services" written in the boxes. When user clicks on the first rectangle Home.aspx page should be opened. Similarly, when user clicks on the Product rectangle the product.aspx and Service rectangle then service.aspx should be opened. Use ImageMap control.
8. Using AdRotator control, display 3 images of car and when user clicks on it, open website of it. Load the advertisement details from the XML.
9. Write code to upload only image files (.bmp, .jpg, .gif) and less than 1 kb in folder "Image-Folder". Also display uploaded image files on the same web page using datalist control.
10. Create a form to display total number users visited a website.

2. Unit Title: Master page, Navigation, Validation, Login controls, Data Controls **15** **01**

1. Design a master page with header, sidebar, footer and content section. In the sidebar display menu such as: Home, Category-(Men, Women), About Us, Contact Us, Register and Login. Display organization name in the header and copyright warning in the footer. Create a menu using the sitemap and provide links to various pages.

2. Design a web page to take eno, empid, ename, username, password, confirm password, Date of birth, gender, city, email, mobile number, Experience years. Do validations as below:
    - All fields are compulsory
    - EmpID as "EMP0001" i.e. first 3 characters "EMP" with 4 digits
    - Name should contain only alphabets.
    - Minimum length of password should be 8
    - Birth date should be between 1985 and 2000.
    - Experience years between 2 to 10.
    - Email should be in valid format.
    - Mobile number should of exactly 10 digits.
    - City compulsory "Ahmedabad"
    - Give demo of validation summary
3. Extends the program 2, if all data is valid then store it into a table employee of database organization and display all records from an employee table with proper formatting using a repeater control. Also allow to delete or update record**.(Note: eno field of employee table is autoincrement)**
4. Create a database with two tables as "Category", which contain category id and category name and "Products" which contain products details such as prod_id, cat_id, prod_name, price, descpription, prodimgurl) for each product. Display name of all the categories in a DropDownList and according to user's choice, particular categories product's details record should display in a Griview control. Allow to update and delete records through the gridview.
5. Using database of program 4, design a web page which shows hyperlink for each unique category. When user click on specific hyperlink pass that category to another page called ProductList.aspx. This page lists all products which belong to the category selected by the user on the previous page. The page shows small image of the product and price only. When user clicks on small product image then user will be redirected to ProductDetails.aspx page which shows all the details of the product with larger image.
6. Develop a web application to reserve online in a hotel. The user should enter/select date of arrival, number of days, room type, number of persons etc. He would be able to confirm booking and allowed to pay advance on

confirmation. (Make table RoomType : RoomTypeid, RoomType, Price)

7. Display name of State in dropdown list. Allow the user to select the state and display the name of cities using datareader. Create Table State (State_id, State_Name) and City (City_id, City_name, State_id)
8. Design a web site which allows user to login. As user logins, the home page display Welcome message based on the type of user.
   For example, for anonymous user show "Welcome Visitor", for User show "Welcome <UserName>" and for any user belongs to admin role, show "Welcome Administrator".
9. Create four tables as given:
   Customer (CustomerCode, Name, Address)
   Product (ProductCode, ProductName, Price, Qty)
   SalesMaster (InvoiceNumber, CustomerCode, DateofInvoice)
   SalesDetails (InvoiceNumber, ProductCode, Qty, UnitPrice)
   Design a webpage to generate Invoice details in which Customer name, Product name, and Line total (Unit price * Quantity) is shown using GridView.
10. Create a form(s) to show the use of different login controls.

Text Book/s:

1. Professional ASP.NET 3.5 (Sp1) In C# and VB by Bill Evjen, Scot Hanselman and David Rader (Wrox)

References:

1. ASP.NET 4 UNLEASED by Stephen Walther (Pearson)

E-Resources:

1. https://www.javatpoint.com/asp-net-tutorial
2. https://www.tutorialspoint.com/asp.net/index.htm
3. https://www.youtube.com/watch?v=3AYoipyqOkQ&list=PL6n9fhu94yhXQS_p1i-HLIftB9Y7Vnxlo

Accomplishments of the student after completing the Course:

After completion of this course, students will be able to

- 1. Understand server-side technology and use of webserver.
- 2. Understand different web server controls available in ASP.NET.
- 3. Mange security and personalization in ASP.NET website.
- 4. Validate different kind of data, and design master page.
- 5. Design GUI enabled interface using data controls to manage database.

Course Name: Numerical Methods

Course Code: BCA-M-204 T

Credits: 2

Course Outcomes:

The aim of this course is to enable students to solve linear and non-linear algebraic equations, perform operations of calculus and fitting curves mathematically.

Prerequisites: Basic Mathematics.

Contents:

Unit No.	Particulars	Hours	Credits
1.	**Unit Title: Iterative Methods to solve non-linear equation, Interpolation and Approximation:** Bisection, false position, Secant, Newton-Raphson and Successive approximation method for non-linear equation. Polynomial interpolation, Truncation error in interpolation, difference tables and calculus of differences, cubic splines, inverse interpolation. Approximation of function by Taylor series and Chebyshev polynomials.	15	1
2.	**Unit Title: Numerical Differentiation and Integration:** Differentiation formulas based on polynomial fit, pit-falls in differentiation. Trapezoidal, Simpson's and Gaussian Quadrature formulas.	15	1

References:

1. Numerical Methods for Mathematics, Science and Engineering
   Publisher: Prentice Hall of India (second edition)
   Author: John H. Mathews
2. Numerical Methods
   Publisher: S.Chand
   Author: P.Kandasamy, K.Thilagavathy, K.Gunavathi

Accomplishments of the student after completing the Course:

After completion of this course Student would be able to

- to understand the basic theory for optimizing processes, and enhance the performance of computational systems.

Course Name: Numerical Methods Applications
Course Code: BCA-M-205 P

Credits: 2

Course Outcomes:

The aim of this course is to enable students to solve non-linear algebraic equations, perform operations of calculus and fitting curves using a computer.

Prerequisites: Command on C language.

Contents:

Unit No.	Particulars	Hours	Credits
1.	**Unit Title: Iterative Methods to solve non-linear equation, Interpolation and Approximation:** Programming in C language to solve on non-linear equation. Programming in C language for polynomial interpolation.	30	1
2.	**Unit Title: Numerical Differentiation and Integration:** Programming in C language for Trapezoidal, Simpson's and Gaussian Quadrature formulas.	30	1

Practicals:

1. Write a program to find the root of the equation using Bisection method.
2. Write a program to find the root of the equation using False Position method.
3. Write a program to implement Secant method to find the root of the equation.
4. Write a program to find the root of the equation using Successive approximation method.
5. Write a program to find the root of the equation using Newton Raphson method.
6. Write a program to perform Lagrangian interpolation formula to find y(x) for given value of x and table of values.
7. Write a program to perform Lagrangian inverse interpolation formula to find x(y) for given value of y and table of values.
8. Write a program to perform Newton's forward Interpolation method to find y(x) for given value of x and table of values.
9. Write a program to perform Newton's backward Interpolation method.
10. Write a program to perform Newton's Divided difference method.
11. Write a program to integrate the given values using Trapezoidal Rule of Integration.
12. Write a program to evaluate Integral using Simpson's $1/3^{rd}$ rule.
13. Write a program to evaluate Integral using Simpson's $3/8^{th}$ rule.
14. Write a program to evaluate Integral using Gauss's Guadrature formula.

References:

1. Computer Based Numerical and Statistical Techniques
   Publisher: Vayu Education of India
   Author: Dr. Anil Kumar
2. Computer Oriented Numerical Methods
   Publisher: Vikas Publishing House pvt ltd.
   Author: Dr. N. Datta

Accomplishments of the student after completing the Course:

After completion of this course Student would be able to

- to understand the basics for optimizing processes, and enhance the performance of computational systems.

Course Name: Web Security

Course Code: BCA-M-245 T

Credits: 2

Course Outcomes:

The aim of the course is to enable students to:

- Demonstrate Understanding of Web Security Fundamentals
- Apply Authentication and Authorization Techniques:
- Implement Secure Communication Protocols:
- Employ Input Validation and Sanitization Practices:
- Configure Security Headers and Content Security Policies
- Mitigate Cross-Site Scripting (XSS) and Cross-Site Request Forgery (CSRF) Attacks:
- Develop Secure Web Applications

Prerequisites:

NIL

Contents:

Unit-1. **Unit Title: Fundamentals of Web Security** **15 Hrs.** **01**

Introduction to Web Security

- Overview of web security concepts and importance
- Common threats and vulnerabilities in web applications
- Principles of secure web development

Authentication and Authorization

- Authentication methods: passwords, multi-factor authentication, OAuth, etc.
- Authorization mechanisms: role-based access control, access control lists, etc.
- Best practices for implementing authentication and authorization in web applications

Secure Communication

- HTTPS and SSL/TLS protocols
- Encryption algorithms and key management
- Preventing common attacks such as man-in-the-middle and eavesdropping

Input Validation and Sanitization

- Importance of input validation in preventing injection attacks (SQL injection, XSS, etc.)
- Techniques for validating and sanitizing user input
- Security implications of client-side vs server-side validation

Unit-2.	Unit Title: Advanced Topics in Web Security	15 Hrs.	01

Security Headers and Content Security Policy

- Overview of security headers: Content-Security-Policy, X-Content-Type-Options, etc.
- Implementing and configuring security headers in web applications
- Role of Content Security Policy (CSP) in mitigating XSS and other attacks

Cross-Site Scripting (XSS) and Cross-Site Request Forgery (CSRF)

- Understanding XSS and CSRF attacks
- Prevention techniques: input validation, output encoding, CSRF tokens, etc.
- Real-world examples and case studies of XSS and CSRF vulnerabilities

Security Testing and Vulnerability Management

- Techniques for identifying security vulnerabilities: manual testing, automated scanners, etc.
- Vulnerability management lifecycle: discovery, prioritization, remediation
- Continuous monitoring and improvement of web application security

Security in Modern Web Technologies

- Security considerations for Single Page Applications (SPAs), RESTful APIs, and microservices
- Authentication and authorization in distributed systems
- Securing cloud-based web applications and serverless architectures

Textbook/s:

- "Web Application Security: A Beginner's Guide" by Bryan Sullivan
- "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto
- "OWASP Testing Guide v4" by The Open Web Application Security Project (OWASP)
- "Hacking: The Art of Exploitation" by Jon Erickson

Accomplishments of the student after completing the Course:

After completion of this course, students will be able to

- Comprehensive Understanding of Web Security
- Hands-On Skills in Secure Web Development
- Ability to Mitigate Common Attacks
- Proficiency in Security Testing and Vulnerability Management:
- Preparation for Security Certification Exams:
- Competitive Edge in the Job Market

Course Name: Web Penetration Testing using DVWA and Wireshark

Course Code: BCA-M-246 P

Credits: 2

Course Outcomes:

The aim of the course is to enable students to:

- Demonstrate Understanding of Web Security Fundamentals
- Apply Authentication and Authorization Techniques:
- Implement Secure Communication Protocols:
- Employ Input Validation and Sanitization Practices:
- Configure Security Headers and Content Security Policies
- Mitigate Cross-Site Scripting (XSS) and Cross-Site Request Forgery (CSRF) Attacks:
- Develop Secure Web Applications

Prerequisites:

NIL

Contents:

Unit-1. **Unit Title: Introduction to Web Penetration Testing** **30 Hrs.** **01**

Overview of Web Penetration Testing

- Introduction to penetration testing methodologies and frameworks
- Understanding the importance of penetration testing in web security
- Overview of common tools and techniques used in web penetration testing

Setting Up the Environment

- Installation and configuration of Damn Vulnerable Web Application (DVWA)
- Setting up Wireshark for network traffic analysis
- Configuring a virtual lab environment for safe and controlled testing

Information Gathering

- Techniques for gathering information about the target web application
- Using tools such as Nmap, WHOIS, and Google Dorks to enumerate targets
- Understanding the importance of reconnaissance in the penetration testing process

Vulnerability Analysis

- Identifying and analyzing common vulnerabilities in web applications
- Using tools such as Burp Suite and OWASP ZAP for vulnerability scanning

- Manual inspection and analysis of web application source code and configurations

Unit-2.	Unit Title: Advanced Web Penetration Testing Techniques	30 Hrs.	01

Exploitation and Post-Exploitation

- Exploiting vulnerabilities identified during the vulnerability analysis phase
- Gaining unauthorized access to the target system and escalating privileges
- Performing post-exploitation activities such as data exfiltration and persistence

Web Application Firewall (WAF) Evasion

- Understanding the role of WAFs in web security and their limitations
- Techniques for bypassing WAFs and evading detection during penetration testing
- Real-world examples of WAF evasion techniques and their effectiveness

Client-Side Attacks

- Exploiting client-side vulnerabilities in web applications
- Conducting attacks such as CSRF, clickjacking, and browser exploitation
- Mitigation strategies for defending against client-side attacks

Reporting and Documentation

- Writing comprehensive penetration testing reports
- Communicating findings, vulnerabilities, and recommendations effectively to stakeholders
- Documenting the entire penetration testing process for audit and compliance purposes

Practical:

1. How do you install DVWA on your local machine?
2. Perform a reconnaissance using Nmap and identify open ports on the target machine.
3. Utilize Google Dorks to discover sensitive information exposed by the target website.
4. Conduct a vulnerability scan on DVWA using Burp Suite.
5. Identify and exploit a SQL injection vulnerability in DVWA.
6. Perform cross-site scripting (XSS) attacks on DVWA and demonstrate different types of XSS.
7. Use OWASP ZAP to identify security vulnerabilities in DVWA.
8. Analyze the HTTP traffic using Wireshark and identify potential security issues.
9. Exploit a file upload vulnerability in DVWA to gain unauthorized access.
10. Perform directory traversal attacks on DVWA and access sensitive files.

11. Exploit a remote code execution vulnerability in DVWA and gain command execution on the target machine.
12. Perform a brute force attack on DVWA login page and demonstrate successful authentication bypass.
13. Evade detection by the WAF installed on DVWA while exploiting vulnerabilities.
14. Exploit a file inclusion vulnerability in DVWA to execute arbitrary code.
15. Perform a session fixation attack on DVWA and hijack a user's session.
16. Conduct a man-in-the-middle attack using Wireshark and intercept sensitive data.
17. Exploit a deserialization vulnerability in DVWA and gain remote code execution.
18. Bypass a CAPTCHA mechanism implemented in DVWA and automate form submissions.
19. Implement a cross-site request forgery (CSRF) attack on DVWA and perform unauthorized actions.
20. Write a detailed penetration testing report for DVWA, documenting findings, vulnerabilities, and recommendations.

Textbook/s:

- "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto
- "Penetration Testing: A Hands-On Introduction to Hacking" by Georgia Weidman
- "Advanced Penetration Testing: Hacking the World's Most Secure Networks" by Wil Allsopp
- "The Hacker Playbook 3: Practical Guide to Penetration Testing" by Peter Kim

Accomplishments of the student after completing the Course:

After completion of this course, students will be able to

- Comprehensive Understanding of Web Security
- Hands-On Skills in Secure Web Development
- Ability to Mitigate Common Attacks
- Proficiency in Security Testing and Vulnerability Management:
- Preparation for Security Certification Exams:
- Competitive Edge in the Job Market
