MANGALORE UNIVERSITY

State Education Policy – 2024
[SEP-2024]

CURRICULUM STRUCTURE

FOR

BCA

BACHELOR OF COMPUTER APPLICATIONS

MANGALORE UNIVERSITY

Suggested Programme Structure for the Under Graduate Programmes

[BCA, BCA (A.I & M.L), BCA (D.A)]

Semester	Course 1	Course 2	Course 3	Elective / Optional	Course	Language	Compulsory	Total Credit	Total Working hour
I	5 (3T+2P)	5 (3T+2P)	5 T			3+3	2	23	4+4+4+4+5+4+4+2=31
II	5 (3T+2P)	5 (3T+2P)	5T			3+3	2	23	4+4+4+4+5+4+4+2=31
III	5 (3T+2P)	5 (3T+2P)	5T	2		3+3		23	4+4+4+4+5+4+4+2=31
IV	5 (3T+2P)	5 (3T+2P)	5T	2		3+3	2	25	4+4+4+4+5+2+4+4+2=33
V	8[(2x3T)+2P]	8[(2x3T)+2P]	8[(2x3T)+2P]				2	26	3+3+4+3+3+4+3+3+4+2=32
VI	3T	3T	3T		3T	Project work 12		24	3+3+3+3+24=36
Total Credits for the Programme								**144**	

Note:

- **Course1 and Course2: I to IV Semester: Theory 3 credits=4 contact hours & Practical 2 credits=4 contact hours**
- **Course3: I to IV Semester: Theory 5 credit=5 contact hours**
- **Course1, Course2 and Course3: V and VI Semester: Theory 3 credits=3 contact hours & Practical 2 credits=4 contact hours**
- **Elective/Optional: 2 credits=2 contact hours**
- **Languages: 3 credits=4 contact hours**
- **Compulsory: 2 credits=3 contact hours**

CURRICULUM STRUCTURE FOR III AND IV SEMETER BCA

Semester III								
Sl. No	**Course Code**	**TitleoftheCourse**	**Categoryof Courses**	**Teaching Hours per Week**	**SEE**	**IA**	**Total Marks**	**Credits**
1		**Language-I**	**Lang**	**4**	**80**	**20**	**100**	**3**
2		**Language-II**	**Lang**	**4**	**80**	**20**	**100**	**3**
3	**BCACACS301**	Database Management System	**Core**	**4**	**80**	**20**	**100**	**3**
4	**BCACACS302**	C# and Dotnet Framework	**Core**	**4**	**80**	**20**	**100**	**3**
5	**BCACACS303**	Computer Networks	**Core**	**5**	**80**	**20**	**100**	**5**
6	**BCACAPS304**	DBMS-Lab	**Practical**	**4**	**40**	**10**	**50**	**2**
7	**BCACAPS305**	C# and Dotnet Framework-Lab	**Practical**	**4**	**40**	**10**	**50**	**2**
8	**BCACAES301**	A) Open Source Tools B) Web Content Management System C) DEVOPS	**Elective**	**2**	**40**	**10**	**50**	**2**
Sub-Total				**31**	**520**	**130**	**650**	**23**

SEMESTER III

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**Database Management System (Theory)**		
Course Code:	**BCACACS301**	No. of Credits	**03**
Contact hours	**52 Hours**	Duration of SEE/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Understand the various database concepts and the need for database systems.
- Identify and define database objects, enforce integrity constraints on a database using DBMS.
- Demonstrate a Data model and Schemas in RDBMS.
- Identify entities and relationships and design ER diagrams for given real-world problems.
- Represent ER model to relational model and its implementation through SQL.
- Formulate queries in Relational Algebra, Structured Query Language (SQL) for database manipulation.
- Understand the transaction processing and concurrency control techniques.

Unit	Description	Hours
1	**Database Architecture**: Introduction to Database system applications. Characteristics, Data models, Database schema, Database architecture, Data independence, Database languages, GUIs, and Classification of DBMS. **E-R Model**: E-R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, Roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E-R diagram.	**13**
2	**Relational Data Model**: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. **Data Normalization**: Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.	**13**

3	**Interactive SQL**: Table fundaments, oracle data types, CREATE TABLE command, Inserting data into table, Viewing Data in the table, sorting data in a table, Creating a table from a table, Inserting data into a table from another table, Delete operations, Updating the contents of a table, Modifying the structure of tables, Renaming tables, destroying tables, displaying table structure. **Data Constraints**: Types of data constraints, IO constraints-The PRIMARY KEY constraint, The FOREIGN KEY constraint, The UNIQUE KEY constraint, Business Rule Constraints- NULL value concepts NOT NULL constraints, CHECK constraint, DEFAULT VALUE concepts. **Computations on Table Data**: Arithmetic Operators, Logical Operators, Range Searching, Pattern Matching, Oracle Table – DUAL, Oracle Function- Types, Aggregate Function, Date Conversion Function. GROUPING DATA FROM TABLES IN SQL, Group By clause, Having clause, subqueries, JOINS, Using the UNION, INTERSECTION, MINUS clause	**13**
4	**Introduction To PL/SQL**: Advantages of PL/SQL, The Generic PL/SQL Block, PL/SQL The character set, Literals, PL/SQL datatypes, variables, Logical comparisons, comments. Control Structure - Conditional Control, Iterative Control **PL/SQL Transactions**: Cursor-Types of Cursors, Cursor Attributes. Explicit cursor- Explicit cursor Management, cursor for loop **PL/SQL Database Objects**: Procedures and Functions, Oracle Packages, Trigger, Error Handling in PL/SQL.	**13**

Text Book:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
2. Oracle and PL/SQL by Ivan Bayross, BPB publications.

Reference Books:

1. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
2. Introduction to Database System, C J Date, Pearson, 1999.
3. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S. Sudarshan, 6th Edition, McGraw Hill, 2010.
4. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/
Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA- GENERAL**	Semester	**III**
Course Title	**C# and Dotnet Framework (Theory)**		
Course Code:	**BCACACS302**	No. of Credits	**03**
Contact hours	**52 Hours**	Duration of SEE/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- To learn about basic features .NET Framework.
- To understand concepts about C#
- To create an ASP.NET application using standard .NET Controls
- To learn about connecting data sources using ADO.NET and managing them.

Unit	Description	Hours
1	**Overview of .NET Framework and Introduction to C#:** Origin of .Net Technology, .NET Framework, Components of the .NET Framework, Common Language Runtime (CLR), Common type system, Common Language Specifications (CLS), Managed code and assemblies, Intermediate Language (IL) and Just-In-Time (JIT) Compilation, .NET Framework of base Classes, Visual Studio.Net, Benefits of .NET approach# and .Net **Introduction to C#:** Overview of C# language features, Namespaces, Structure of a C# program, Literals, Variables and Datatypes, Operators and expressions, Decision making and branching, Decision making and looping, Methods and Strings.	13
2	**Classes and Objects in C#:** Defining Class, Adding members and methods, member access modifiers, Accessing class members, Constructors, types of constructors in C#, constant members and read only members **Inheritance and Polymorphism:** Defining subclass, visibility control, Sub class constructors, Multilevel inheritance, Method overriding, Abstract classes, Operation Polymorphism, Interfaces- implementing interfaces Delegates- Delegate declaration, delegate methods, Delegate instantiation, Delegate invocation, Managing errors and exceptions	13
3	**Graphical user interface with Windows forms:** Visual Studio.net, Components of Visual Studio, Introduction to Windows forms, event handling, simple event driven GUI, control properties and layout, anchoring & docking, windows form controls: Label, Textbox, Buttons, groupbox, panel, checkbox, Radio Buttons, Picture box, Tooltips, NumericUpDown control, Mouse and Keyboard Event Handling. Creating	13

	Menus, Month Calendar Control, Datetime Picker Control, Linked Label control, Listbox, Checked Listbox, Combo Box control. Creating MDI forms, MDI parent and child forms. User Defined Controls	
4	**ADO.NET database Programming with C#:** Overview of ADO.NET, Data providers and their classes, ADO.NET datasets, working with data sources and datasets, handling data errors, working with data bound controls binding textbox and combo box to data source, working with data GridView control, working with connection, command and data reader objects **Web based Application on .NET** - ASP.net, Standard web controls – Text, Button, Hyperlink, dropdownlist & image. Validation Controls. Creating simple web application using ASP.NET	13

Text Books

1. E Balagurusamy Programming in C#, A Premier, Third Edition
2. C# 2010 for Programmers Paul Deitel and Harvey Deitel Fourth Edition
3. ADO.NET database programming with C#, Anne Boehm, & Ged Mead

Reference Books:

1. "Programming in C#", E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2017.
2. "ASP.NET and VB.NET Web Programming", Matt J. Crouch, Edition 2012.
3. "Computing with C# and the .NET Framework", Arthur Gittleman, 2nd Edition, Jones & Bartlett Publishers, 2011

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/
Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA- GENERAL**	Semester	**III**
Course Title	**Computer Networks (Theory)**		
Course Code:	**BCACACS303**	No. of Credits	**05**
Contact hours	**60 Hours**	Duration of SEE/Exam	**3 Hours**
Formative Assessment Marks	**20**	Summative Assessment Marks	**80**

Course Outcomes (COs):

At the end of the course, students will be able to:

- Explain the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
- Apply the basics of data communication and various types of computer networks in real world applications.
- Compare the different layers of protocols.
- Compare the key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.

Unit	Description	Hours
1	**Introduction:** Uses of Computer Networks and its Applications- Business Applications, Home Applications, Mobile Users, Social Issues. **Network Hardware**-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks, Network software **Reference Models**-The OSI Reference Model, The TCP/IP Reference Model, A Comparison of the OSI and TCP Reference Models.	**15**
2	**The Physical Layer**: Transmission Media-Twisted Pair, Coaxial Cable, and Fiber Optics. Wireless Transmission-Radio Transmission, Microwave Transmission, Infrared, Light Transmission. Multiplexing- Frequency division, time division. **The Data Link Layer**: Data link layer design issues - Services Provided to the Network Layer, Framing, Error Control, and Flow Control. Error Detection and Correction-Error-Correcting Codes, Error – Detecting Codes.	**15**
3	**The Network Layer**: Network layer design issues-Store- and-Forward Packet Switching, Services Provided to the Transport Layer, implementation of Connectionless Service, Implementation of Connection-Oriented Service. Routing Algorithms-Flooding, Distance Vector Routing, Link State Routing, Approaches to Congestion Control, The IP Version4 Protocol, IP Address, IP Version 6.	**15**

4	**The Transport Layer:** The Transport Service-Services Provided to the Upper Layers. Elements of Transport Protocols-Addressing, Connection Establishment, and connection Release. The Internet Transport Protocols-(TCP and UDP)-UDP-Introduction to UDP, Remote Procedure Call, Real-Time Transport Protocols, TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release. **The Application Layer**: DNS–Domain Name System-The DNS Name Space, Name Servers. Electronic Mail-Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery.	**15**

Text Book:

1. Computer Networks, Andrew S. Tanenbaum, 5thEdition, Pearson Education,2010.

Reference Books:

1. Data Communication & Networking, Behrouza A Forouzan, 3rd Edition, Tata Mc GrawHill, 2001.
2. Data and Computer Communications, William Stallings, 10thEdition, Pearson Education, 2017.
3. Data Communication and Computer Networks ,Brijendra Singh, 3rd Edition, PHI, 2012.
4. Data Communication & ,Dr.Prasad, Wiley Dreamtech.

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**DBMS-Lab**		
Course Code:	**BCACAPS304**	No. of Credits	**02**
Contact hours	**52 Hours**	Duration of SEE/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART-A

1. Create a table EMPLOYEE using SQL command to store details of employees such as EMPNO, NAME, DESIGNATION, DEPARTMENT, GENDER and SALARY. Specify Primary Key and NOT NULL constraints on the table. Allow only 'M' or 'F' for the column GENDER. DEPARTMENT can be SALES, ACCOUNTS, IT. Choose DESIGNATION as CLERK, ANALYST, MANAGER, ACCOUNTANT and SUPERVISOR that depends on department

   Write the following SQL queries:

   a) Display *EMPNO, NAME* and *DESIGNATION* of all employees whose name ends with RAJ.
   b) Display the details of all female employees who is earning salary within the range 20000 to 40000 in SALES or IT departments
   c) List the different DEPARTMENTs with the DESIGNATIONs in that department.
   d) Display the department name, total, average, maximum, minimum salary of the DEPARTMENT only if the total salary given in that department is more than 30000.
   e) List the departments which have more than 2 employees.

2. Create a table CLIENT to store CLIENT_NO, NAME, ADDRESS, STATE, BAL_DUE. Client no must start with 'C'. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records.

   Write the following SQL queries:

   a) From the table CLIENT, create a new table CLIENT1 that contains only CLIENT_NO and NAME , BAL_DUE from specified STATE. Accept the state during run time.
   b) Create a new table CLIENT2 that has the same structure as CLIENT but with no records. Display the structure and records.
   c) Add a new column by name PENALTY number (10, 2) to the CLIENT

d) Assign Penalty as 10% of BAL_DUE for the clients C1002, C1005, C1009 and for others 8%. Display Records
e) Change the name of CLIENT1 as NEW_CLIENT
f) Delete the table CLIENT2

3. Create a table BOOK using SQL command to store Accession No, TITLE, AUTHOR, PUBLISHER, YEAR, PRICE. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table.Insert 10 records.

Write the following SQL queries:

a) List the details of publishers having 'a' as the second character in their names.
b) Display Accession No., TITLE, PUBLISHER and YEAR of the books published by the specified author before 2010 in the descending order of YEAR. Accept author during run time
c) Modify the size of TITLE to increase the size 5 characters more.
d) Display the details of all books other than Microsoft press publishers.
e) Remove the records of the books published before 1990.

4. Create a table SALES with columns SNO, SNAME, MNO , JOIN_DATE, DATE_BIRTH, SALARY,SALES_AMOUNT and COMMISSION. Minimum age for joining the company must be 18 Yrs. Default value for Commission should be 0. Apply the suitable structure for the columns. Specify Primary Key and NOT NULL constraints on the table. Insert 10 records with data except commission. Manager of Manager can be NULL.

Write the following SQL queries:

a) Display the details of Sales Persons whose salary is more than Average salary in the company.
b) Update commission as 20% of Sales Amount.
c) Display SNO, SNAME, MNO, SALARY, COMMISSION, MANAGER_SALARY of the sales persons getting sum of salary and commission more than salary of manager.(Self join)
d) Display the records of employees who finished the service of 10years

5. Create a table Sales_Details with the columns SNO, MONTH, TARGET and QTY_SOLD to store the Sales Details of one year. Specify the composite primary key to the columns SNO and MONTH. TARGET and SALES must be positive numbers.

Write the following SQL queries:

a) Display the total sales by each sales person considering only those months sales where target was reached
b) If a commission of RS.50 provided for each item after reaching target, calculate and display the total commission for each sales person.
c) Display the SNO of those who never reached the target.
d) Display the SNO, MONTH and QTY_SOLD of the sales persons with SNO S0001 or S0003

6. Create the following tables by identifying primary and foreign keys. Specify the not null property for mandatory keys.
SUPPLIERS(SUPPLIER_NO,SNAME,SADDRESS,SCITY)
COMPUTER_ITEMS(ITEM_NO,SUPPLIER_NO,ITEM_NAME, IQUANTITY) Consider three suppliers. A supplier can supply more than one type of items.

Write the SQL queries for the following:

a) List ITEM and SUPPLIER details in alphabetical order of city name and in each city decreasing order of IQUANTITY.
b) List the name ,city,and address of the suppliers who are supplying keyboard.
c) List the supplier name, items supplied by the suppliers 'Cats' and 'Electrotech'.
d) Find the items having quantity less than 5 and insert the details of supplier and item of these, into another table NEWORDER

7.Create the following tables by identifying primary and foreign keys, specify the not null property for mandatory keys.

PRODUCT_DETAIL				
P_NO	**PRODUCTNAME**	**QTYAVAILABLE**	**PRICE**	**PROFIT %**
P0001	Monitor	10	3000	20
P0002	Pen Drives	50	650	5
P0003	CD Drive	100	10	3
P0004	Key Board	25	600	10

PURCHASED_DETAIL		
CUSTNO	**P_NO**	**QTYSOLD**
C1	P0003	2
C2	P0002	4

C3	P0002	10
C4	P0001	3
C1	P0004	2
C2	P0003	2
C4	P0004	1

PART B

1. Create a table Bank with the columns ACNO, ACT_NAME, ACT_TYPE and BAL. Specify the Primary Key. Initial BAL must be greater than 500.

   Write a PL/SQL program to perform debit operation by providing acct_no and amount required. The amount must be greater than 100 and less than 20000 for one transaction. If the account exist and BAL-amount>500 Bank table must be updated, otherwise "NO SUFFFICIENT BALANCE" message should be displayed. If account number is not present then display "NO SUCH ACCOUNT" message to the user.

2. Create a table STOCK_DETAIL with the columns PNO, PNAME and QTY_AVL to store stock details of computer accessories. Specify Primary Key and NOT NULL constraints on the table. QTY_AVL should be positive number.

Write the following SQL queries:

a) Display total amount spent by C2.
b) Display the names of product for which either QtyAvailable is less than 30 or total QtySold is less than 5(USE UNION).
c) Display the name of products and quantity purchased by C4.
d) How much Profit does the shopkeeper gets on C1's purchase?
e) How many 'Pen Drives' have been sold?

Write a PL/SQL Program to define a user defined exception named "LOW_STOCK" to validate the transaction. The program facilitates the user to purchase the product by providing product number and quantity required. It should display an error message "NO SUFFICIENT STOCK" when the user tries to purchase a product with quantity more than QTY_AVL, Otherwise the STOCK_DETAIL table should be updated for valid transaction.

3. Write a PL/SQL program to compute the selling price of books depending on the book code and category. Use Open, Fetch and Close. The Book_detail table contains columns: Book Code, Author, Title, Category and Price. Insert 10 records. The selling price=Price-Discount.

The discount is calculated as follows:

Book Code	Category	Discount Percentage
A	Novels	10% of Price
	Technology	12.5% of Price
B	Commerce	18% of Price
	Science	19% of Price
C	Songs	25% of Price
	Sports	24% of Price
D	All	28% of Price

Print the result in tabular form with proper alignment

Book Code	category	title	author	price	discount %	discount amount	sell price
=====	========	=====	====	=====	=======	=====	

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4. Write a PL/SQL program to display employee pay bill (using Cursor For loop) Use a Procedure to receive basic pay and to compute DA, HRA, Tax, PF, Gross Pay and Net Pay(Use OUT). Base table contains the following columns empnum, empname, basic pay. Insert 3 records.

Allowances are computed as follows.

Basic Pay	DA	HRA
<=20000	35% of Basic	8% of Basic
>20000 & <=30000	38%	9%
>30000 & <=40000	40%	10%
>40000	45%	10%

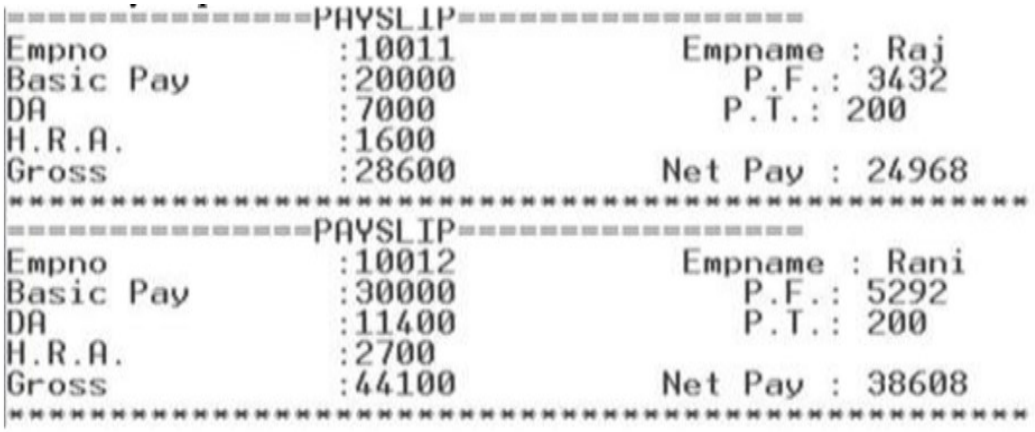
Gross=Basic+DA+HRA

PF=12% of Gross or Rs. 2000 whichever is minimum.

PT=Rs. 100 upto Gross is 25,000 else Rs. 200.

Net=Gross-(PF+PT)

Print Pay slip as follows



5. Given the following tables: ITEM_MASTER(itemno, name, stock, unit_price) [Apply the Primary key and check constraint for stock and price as >0] [Insert 5 records] ITEM_TRANS(itemno, quantity and trans_date)

   Create a **package** PCK_ITEM includes a function CHK_ITEM and a procedure PROC_ITEM.

   Function CHK_ITEM gets one argument itemno and is used to check whether the parameter itemno exists in ITEM_MASTER and should return 1 if exist. Otherwise 0 and displays proper message.

   Procedure PROC_ITEM gets two arguments itemno and quantity, and is used to perform the following if item exists. If required quantity is not available, give appropriate message. If available , insert a record of this transaction to ITEM_TRANS and modify the stock in ITEM_MASTER.

   Write a PL/SQL program to accept ITEM_NO and Quantity needed of required item. Use Package to do the transaction process(Transaction date can be current date). OUTPUT to be shown as follows:

```
Enter value for accept_itemno: 1
old   5:            X:=&accept_itemno;
new   5:            X:=1;
Enter value for quantity: 3
old   6:          M:=&quantity;
new   6:          M:=3;
Item :aa   Quantity  :3  Price  :15 Total Amount  :45
```

6. Create a package which includes a function to compute the factorial of a number, a procedure to compute the value of nCr, and another procedure to compute nPr both uses the factorial function. Execute the package program for the required calculation

7. Create a trigger to update the MASTER table when a record is inserted into SALES table and create another trigger to update the MASTER table when a record is inserted or updated or deleted in NEWSTOCK table. Assume the suitable columns for all the tables.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**C# and Dotnet Framework -Lab**		
Course Code:	**BCACAPS305**	No. of Credits	**02**
Contact hours	**52Hours**	Duration of SEE/Exam	**3 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

PART A

1. Write a C# program to which reads a set of strings and then print the string having highest number of vowels.

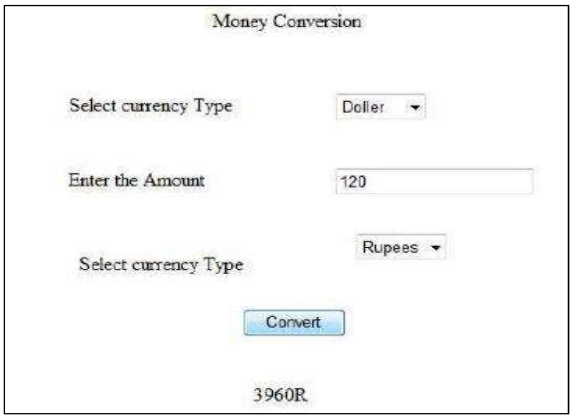
2. Write a C# program to create a lists Topics. The values are
   Topics ={"Introduction to C#", "Variables", "Data Types", "Loops", "If statements", "Jump Statements", " Class & Object", "Inheritance", "Constructors"}. Using switch case statements categorise the topics as "Basic", "Control Flow" and "OOPs Concepts"
   Sample Output:
   Topic is Introduction to C#;Category is Basic
   Topic is Variables ;Category is Basic
   Topic is Data Types; Category is Basic
   Topic is Loops; Category is Control Flow
   Topic is If Statements; Category is Control Flow
   Topic is Jump Statements; Category is Control Flow
   Topics is Class & Object; Category is OOPs Concept
   Topic is Inheritance; Category is OOPS Concept

3. Write a C# Sharp program to make such a pattern like a right-angled triangle with the number increased by 1.
   The pattern like :
   1
   2 3
   4 5 6
   7 8 9 10

4. Write a Program in C# to find addition and Multiplication operation on two complex number using operator overloading.

5. Create an application that allows the user to enter a number in the textbox named ‘getnum’. Check whether the number in the textbox ‘getnum’ is palindrome or not. Print the message accordingly in the label control named lbldisplay when the user clicks on the button ‘check’.

6. Design a Webpage of a Hotel which display different Menu as per the Time of Visit.
7. Write a program to perform money conversion

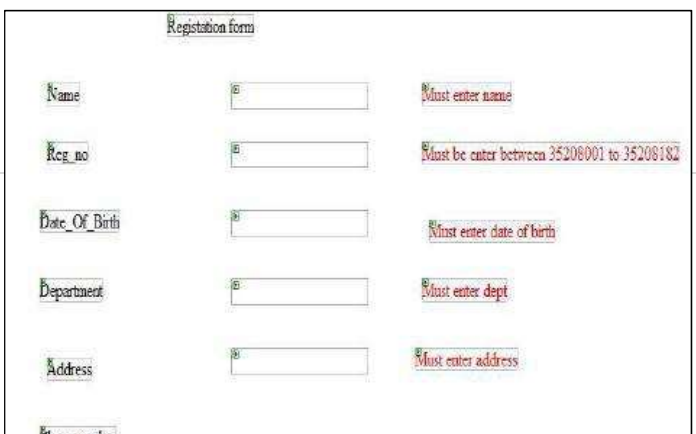


PART B

1. Create a web application that uses the AdRotator control to display a list of three advertisements using an XML file. Each ad must have an image, a navigation link, and alternate text. Also display one paragraph information about the advertisement below the AdRotator
2. Write a Program in C# define a Class "Salary" which will contain member variable Emp_no,Emp_name,Dob Basic Write a program using constructor. And method to calculate the DA, HRA, PF, IT, GROSS and NETPAY using appropriatecondition.

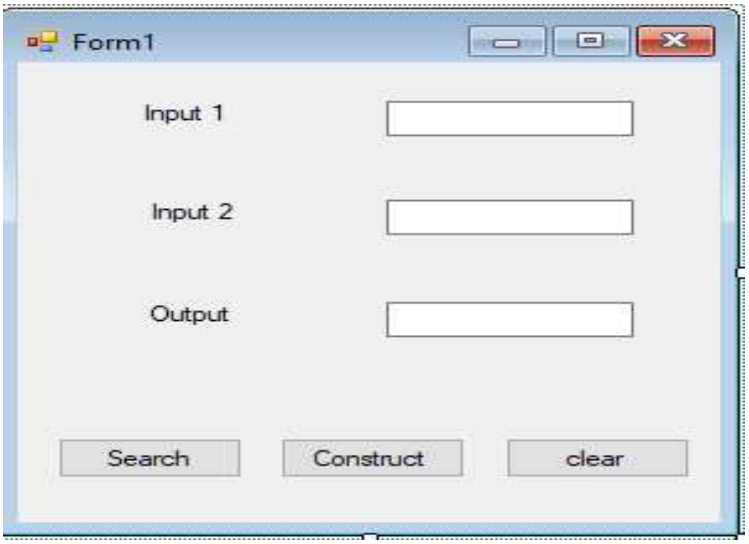
   If Basic <= 20000 D.A is 40% Basic H.R.A is 10% Basic.
   P.F 12% of Gross; PT is Rs .100
   If Basic.> 20000 D.A is 50% Basic. H.R.A 15% Basic.
   P.F 12% of Gross ; PT is Rs.150
   Gross = Basic.+D.A +HRA and Net = Gross -PT –PF

3. Write an application that receives the following information from a set of students: Student Id ,Student Name, Course Name, and Date of Birth. The application should also display the information of all the students once the data is Entered. Implement this using an Array of Structures.
4. Create a Web Form for Login Module which adds a Username and Password to the database. The username in the database should be a primary key
5. Design a Admission form with client-side validations



6. Design a webpage to enter Student information such as Student no, Student Name, marks in 3 subjects. Use the following buttons for,
    - Add -> for adding the record to the database (Insert at least 5 records). Calculate total, %, grade and store it.
    - Display – Display the records from the database

7. Create ASP .NET web application with the given user interface to input two strings(str1,str2) and performs two operations "Search" and Construct" by clicking respective buttons. The result of both operations shall be displayed on Output TextBox.
   SERACH: If the user clicks on "Search" button then appearance of str2 is searched in str1 and removed from str1. Also, the characters if str1, before and after str2 are concatenated together. Ignore the cases where there is no character in str1 before or after the str2.



Input and Outputs:
Sample1:

str1: hardmetalironissmoothwhenheatedhard
str2: hard
Output: metalironissmoothwhenheated

Sample2:
str1: mylifelessonsarebestlifequotes
str2: life
Output: mylessorsarebestquotes

CONSTRUCT: If user clicks on "Construct" button then the concatenation of first character of str1, the first character of str2, second character of str1, second character of str2 and so on.., is performed to create the new string. The remaining characters at the end of str1or str2 are concatenated to the end of the resultant string.

Input and Outputs:
Sample1:
str1: Welcome
str2: Csharp
Output: WCeslhcaormpe

CLEAR: clear button should clear all the TextBoxes.

Evaluation Scheme for Lab Examination:

Assessment Criteria		
Program-1	**PART-A** **Writing:7 Marks Execution: 8Marks**	**15 Marks**
Program-2	**PART-B** **Writing:10 Marks Execution:10Marks**	**20 Marks**
Practical Record		**05 Marks**
Total		**40 Marks**

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**Open Source Tools (Elective)**		
Course Code:	**BCACAES301**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEE/Exam	**2 hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand the concept of Open-Source software.
- Know the benefits and challenges of using Open-Source tools.
- Use Open-Source tools for development and deployment.
- Make informed decisions about Open-Source tool selection.

Unit	Description	Hours
1	**Open Source Software:** **Open Source Tools**: Introduction to Open sources, Need of Open Sources, Open Source –Principles, Standard Requirements, Advantages of Open Sources. **Free Software** – FOSS **Licenses** – GPL, LGPL, Copyrights, Patents, Contracts & Licenses and Related Issues **Application of Open Sources:** Open-Source Operating Systems: FEDORA, UBUNTU	**8**
2	**Programming Tools and Techniques:** i. Usage of design Tools like Argo UML or equivalent ii. Version Control Systems like Git or equivalent iii. Bug Tracking Systems (Trac, BugZilla) i. BootStrap	**8**
3	**Case Studies**: Apache ii. Berkeley Software Distribution iii. Mozilla (Firefox) iv. Wikipedia v. Joomla vi. GNU Compiler Collection vii. Libre Office	**10**

Text Book:

1. Kailash Vadera, Bhavyesh Gandhi, “Open-Source Technology”, Laxmi Publications Pvt. Ltd 2012, 2nd Edition.

Reference Book:

1. Fadi P. Deek and James A. M. McHugh, “Open Source: Technology and Policy”, Cambridge Universities Press 2007

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/
Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**Web Content Management System (Elective)**		
Course Code:	**BCACAES302**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEE/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Understand content development basics.
- Gain Knowledge of tools for multimedia content development for audio/ video, graphics, animations, presentations, screen casting ‘
- Host websites and develop content for social media platforms such as wiki and blog
- Understand e-publications and virtual reality
- Use of e-learning platform Moodle and CMS applications Drupal and Joomla

Unit	Description	Hours
1	**Web Content Management System**: Introduction, Types of CMS, Difference between WCMS and CMS, WCMS-Features, Advantages, Disadvantages, Types of WCMS, Content Types and Formats, Content Tools (Media-wise), Needs and Guidelines of Content Development.	**8**
2	**Static website and dynamic website**- Features, Differences; **Dynamic Web content sites :**Creating Dynamic Web Content, **Web Hosting and Managing Multimedia Content:** Types of web hosting-advantages and disadvantages, Importance of web hosting, features , steps to host a website; Multimedia content – Benefits, Best practices for creation of multimedia contents, Basic multimedia contents.	**8**
3	**WIKI SITE** – Characteristics, Working, Advantages; **Multilingual Content Development**- Key features, Advantages, Developing multilingual content, Creating multilingual content in WordPress, **Content Management System** – Joomla, WordPress, Drupal; **E- Publication Concept** – Introduction, models/approaches, categories, e-publishing tools.	**10**

Text Books:

1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane Barker.
2. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.
3. Using Joomla: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.

Program Name	**BCA-GENERAL**	Semester	**III**
Course Title	**DEVOPS(Elective)**		
Course Code:	**BCACAES303**	No. of Credits	**02**
Contact hours	**26 Hours**	Duration of SEE/Exam	**2 Hours**
Formative Assessment Marks	**10**	Summative Assessment Marks	**40**

Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

- Design and manage a scalable VDI environment, addressing challenges such as boot storms and hardware limitations.
- Apply various DevOps tools to streamline and automate the software development lifecycle, including infrastructure as code and deployment automation.
- Utilize cloud services (IaaS, PaaS, Hybrid Cloud) to enhance DevOps practices, enabling full-stack deployments and efficient resource management.
- Integrate DevOps with ALM processes to improve the development, deployment, and management of mobile and multi-tier applications, scaling Agile methodologies across the enterprise.
- Define the roles of executives and teams in setting DevOps goals, expanding Agile practices, leveraging test automation, and building efficient delivery pipelines.
- Critically analyze and debunk common myths about DevOps, highlighting its applicability across various industries, including ITIL shops, regulated industries, and large, complex systems.

Unit	Description	Hours
1	**Introduction to DevOps:** Business needs for DevOps, Business values for Devops, How DevOps works. **DevOps Capabalities:** Paths to DevOps Adoption, Plan, Devlop/Test, Deploy, Operate **Adopting DevOps:** Where to Begin, People in DevOps, Process in DevOps, Technology in DevOps	**8**
2	**Using Cloud in DevOps** Cloud as DevOps enabler, Full Stack Deployments, cloud service model for DevOps, Hybrid Cloud **Using DevOps to solve Challenges** Mobile applications, ALM processes, Scaling Agile, Multiple Tier Applications, DevOPs in the enterprise, Supply Chains, IOT.	**8**

3	**DevOps Case Study:** Executive's Role, putting together a team, setting DevOps Goals, Learning from the DevOps transformation, looking at the DevOps results. **DevOps Myths.** **Basics of DevOps tools:** Introduction to Git, Jenkins, Git hub, Docker, Kubernetes.	**10**

Text Books:

1. Real world DevOps Practices by B.Thangaraju Wiley publishers 2024.
2. "DevOps For Dummies" by Sanjeev Sharma & Bernie Coyne. 2nd IBM Limited edition.

Reference Books:

1. " The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology" by Gene Kim, Jez Humble, Patrick Debois, John Willis

2. " the Phoenix Project: A Novel about IT, DevOps, and Helping Your Business Win" by Kim, Behr, Spafford

Pedagogy: Lecture/ PPT/ Videos/ Animations/Demonstration/ Concept mapping/ Case Studies examples/ Tutorial/ Activity/Mini Projects/Problem Solving/Trouble Shooting.