



પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટીની સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગતનો કોમ્પ્યુટર સાયન્સ વિષયનો (બી.સી.એ વિથ ઓનર્સ) નો સેમેસ્ટર-૩ અને સેમેસ્ટર-૪ નો અભ્યાસક્રમ આ સાથે સામેલ છે.

માનનીય કુલપતિશ્રીની મંજૂરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન, ૨૦૨૪ થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજો દ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.



(Signature)
૧૫/૦૬/૨૦૨૪

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/ એકેડેમિક/૭૧૦/૨૦૨૪

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,

સરકારી પોલીટેકનિક કેમ્પસ,

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,

ખડીયા, જૂનાગઢ-૩૬૨૨૬૩

તા.૧૯/૦૬/૨૦૨૪

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાના:-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જૂનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:

- સીસ્ટમ મેનેજરશ્રી, આઈ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)



**BHAKTA KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH**



BOARD OF COMPUTER SCIENCE STUDIES

FACULTY OF SCIENCE

SYLLABUS FOR

B.C.A (HONOURS) PROGRAMME

(SEMESTER- III & IV)

MAJOR/MINOR/MULTIDISCIPLINARY

EFFECTIVE FROM JUNE, 2024

BHAKTA KAVI NARSINH MEHTA UNIVERSITY**Major/Minor/Multidisciplinary****Syllabus of B.C.A.(Honors) as per NEP-2020****Faculty of Science****Effective from June 2024****Subject: Computer Science****SEMESTER-III & IV****SUMMARY OF THE SYLLABUS**

Sem No.	Sr. No.	Category of Course	Course Title	Course Level	Credit	Teaching Hrs.	SEE Marks	CCE Marks	Total Marks	Exam Duration
Sem-3	1	Major-5	OOP Concepts using C++ (Theory)	5.0	Theory 4 Practical 0	Theory-60 Practical-0	50	50	100	2:00 Hrs
	2	Major-6	OOP Concepts using C++ (Practical)	5.0	Theory 0 Practical 4	Theory-0 Practical-120	50	50	100	2:00 Hrs
	3	Major-7	DBMS - I	5.0	Theory 3 Practical 1	Theory- 45 Practical-30	50	50	100	2:00 Hrs
	4	MDC-3	Mathematics	5.0	Theory 4 Practical 0	Theory- 60 Practical-0	50	50	100	2:00 Hrs
				Total	16					

BHAKTA KAVI NARSINH MEHTA UNIVERSITY**Major/Minor/Multidisciplinary****Syllabus of B.C.A.(Honors) as per NEP-2020****Faculty of Science****Effective from June 2024****Subject: Computer Science****SEMESTER-III & IV****SUMMARY OF THE SYLLABUS**

Sem No.	Sr. No.	Category of Course	Course Title	Course Level	Credit	Teaching Hrs.	SEE Marks	CCE Marks	Total Marks	Exam Duration
Sem-4	1	Major-8	Programming in Java (Theory)	5.0	Theory 4 Practical 0	Theory-60 Practical-0	50	50	100	2:00 Hrs
	2	Major-9	Programming in Java (Practical)	5.0	Theory0 Practical 4	Theory-0 Practical-120	50	50	100	2:00 Hrs
	3	Major-10	DBMS - II	5.0	Theory3 Practical 1	Theory- 45 Practical-30	50	50	100	2:00 Hrs
	4	Minor-3	Programming with C#.Net	5.0	Theory3 Practical 1	Theory- 45 Practical-30	50	50	100	2:00 Hrs
				Total	16					

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: Computer Science**SEMESTER-III & IV****SEM-III**

Course Level	5.0	Internal Marks	50
Programme	Bachelor of Computer Application	External Marks	50
Semester	III	Practical Internal	0
Category of Course	Major-5	Practical External	0
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory-60 Practical-0	Total	100
Course Code		Exam Duration	2:00 Hrs
Course Title	OOP Concepts using C++ (Theory)		

Course Objectives:

1. To impart the concept of OOPs
2. To make the learners be able to simulate the real-world situation into programming
3. To impart the concept of polymorphism and inheritance

Course Learning Outcomes:

1. Gaining familiarity with Object Oriented Programming
2. Having ability to simulate real world situation into object orientation
3. Being able to understand and implement OOP practices

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
3	1	• Procedure – Oriented Programming v/s Object oriented programming • Basic concepts and benefits of object-oriented Programming • What is C++? • Structure of C++ program • Tokens: Keywords, identifiers, basic data types, user-defined types, derived data types, declaration of variables, dynamic initialization of variables, reference variables	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		• Operators in C++: Input/output operators, Scope resolution operator, member referencing operator, memory management operator, manipulators, and type cast operator. • Expression: Expression and their types, special assignment operator, implicit conversions • Control structures: ○ Conditional control structure: Simple if, if...else, nested if else, switch etc. ○ Looping control structure: for, while, do...while • Functions in C++: ○ The main function ○ Function prototype ○ Call by reference ○ Return by reference ○ Inline function ○ Default arguments ○ Functions overloading	
	2	• Concept of class: ○ Definition and specification ○ Local Classes, Nested Classes • Declaring member variables and member functions ○ Access Specifiers: public, private, protected ○ Static data member ○ Array within a class ○ nesting of Member functions ○ Friend functions ○ making outside function inline • Objects: ○ Concept of object ○ Memory allocation for objects ○ Arrays of objects ○ Objects as function arguments ○ Returning objects from functions • Constructors: ○ Concept and features of constructor ○ Multiple constructors in a class ○ Parameterized constructor	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

		○ Constructor with default argument ○ Copy constructor ○ Dynamic constructor ○ Explicit constructor ○ Dynamic initialization of objects ● Destructors ○ Concept, definition and call mechanism	
	3	● operator overloading: ○ Definition and concept ○ Rules for operator overloading ○ Over loading unary and binary operators ○ Overloading of operators using friend Function ○ Manipulation of string using operators ○ Type conversions. ○ Comparison of different method of conversion ● Inheritance: ○ Definition and concept ○ Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid) ○ Defining derived classes ○ Constructors in derived class ○ Virtual base class ○ Concept and implementation of virtual functions ○ Containership, Inheritance V/s Containership	15
	4	● Pointers in OOP: ○ Pointer as member variable ○ Pointer to Object ○ Pointer to derived class ○ this pointer ● File handling: ○ Introduction and applications ○ File operations: open, read, write, seek and close ● Exception handling: ○ Concept and need ○ Implementation using try, catch and throw	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Suggested Reading:

Reference Books: No.	Name	Author / Publication
1	Mastering C++	Venugopal
2	Object Oriented programming in C++	Robert Lafore, Pearson Education
3	Object Oriented Programming in C++	E. Balagurusamy, BPB

Web site References:

<https://www.tutorialspoint.com/cplusplus>

<https://www.javatpoint.com/cpp-tutorial>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

Course Level	5.0	Internal Marks	0
Programme	Bachelor of Computer Application	External Marks	0
Semester	III	Practical Internal	50
Category of Course	Major-6	Practical External	50
Course Credit	4	Prac. External Exam Duration	2:00 Hrs
Teaching Hours	Theory-0 Practical-120	Total	100
Course Code		Exam Duration	-
Course Title	OOP Concepts using C++ (Practical)		

Course Objectives:

1. To impart the concept of OOPs
2. To make the learners be able to simulate the real-world situation into programming
3. To impart the concept of polymorphism and inheritance

Course Learning Outcomes:

1. Gaining familiarity with Object Oriented Programming
2. Having ability to simulate real world situation into object orientation
3. Being able to understand and implement OOP practices

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
3	1	• Procedure – Oriented Programming v/s Object oriented programming • Basic concepts and benefits of object-oriented Programming • What is C++? • Structure of C++ program • Tokens: Keywords, identifiers, basic data types, user-defined types, derived data types, declaration of variables, dynamic initialization of variables, reference variables • Operators in C++: Input/output operators, Scope resolution operator, member referencing operator,	30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		memory management operator, manipulators, and type cast operator. • Expression: Expression and their types, special assignment operator, implicit conversions • Control structures: ○ Conditional control structure: Simple if, if...else, nested if else, switch etc. ○ Looping control structure: for, while do...while • Functions in C++: ○ The main function ○ Function prototype ○ Call by reference ○ Return by reference ○ Inline function ○ Default arguments ○ Functions overloading	
	2	• Concept of class: ○ Definition and specification ○ Local Classes, Nested Classes • Declaring member variables and member functions ○ Access Specifiers: public, private, protected ○ Static data member ○ Array within a class ○ nesting of Member functions ○ Friend functions ○ making outside function inline • Objects: ○ Concept of object ○ Memory allocation for objects ○ Arrays of objects ○ Objects as function arguments ○ Returning objects from functions • Constructors: ○ Concept and features of constructor ○ Multiple constructors in a class ○ Parameterized constructor ○ Constructor with default argument ○ Copy constructor ○ Dynamic constructor	30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Explicit constructor ○ Dynamic initialization of objects ● Destructors ○ Concept, definition and call mechanism	
	3	● Operator overloading: ○ Definition and concept ○ Rules for operator overloading ○ Over loading unary and binary operators ○ Overloading of operators using friend Function ○ Manipulation of string using operators ○ Type conversions. ○ Comparison of different method of conversion ● Inheritance: ○ Definition and concept ○ Types of inheritance (Single, Multiple, Multi-level, Hierarchical, Hybrid) ○ Defining derived classes ○ Constructors in derived class ○ Virtual base class ○ Concept and implementation of virtual functions ○ Containership, Inheritance V/s Containership	30
	4	● Pointers in OOP: ○ Pointer as member variable ○ Pointer to Object ○ Pointer to derived class ○ this pointer ● File handling: ○ Introduction and applications ○ File operations: open, read, write, seek and close ● Exception handling: ○ Concept and need ○ Implementation using try, catch and throw	30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Suggested Reading:

Reference Books: No.	Name	Author / Publication
1	Mastering C++	Venugopal
2	Object Oriented programming in C++	Robert Lafore, Pearson Education
3	Object Oriented Programming in C++	E. Balagurusamy, BPB

Web site References:

<https://www.tutorialspoint.com/cplusplus/>

<https://www.javatpoint.com/cpp-tutorial>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

Course Level	5.0	Internal Marks	25
Programme	Bachelor of Computer Application	External Marks	50
Semester	III	Practical Internal	25
Category of Course	Major-7	Practical External	0
Course Credit	IV	Prac. External Exam Duration	-
Teaching Hours	Theory- 45 Practical-30	Total	100
Course Code		Exam Duration	2:00 Hrs
Course Title	DBMS - I		

Course Objectives:

1. To impart the know-how of Data, Data Base and DBMS
2. To make the learners aware about the collection, organisation and management of data
3. To impart how to query data stored in database

Course Learning Outcomes:

1. Getting familiar with data management concepts
2. Gaining understanding about organising and managing data
3. Being able to authenticate and authorise data sources
4. Being able to obtain the desired datasets from the repository of data by querying them

Course Contents

Sem	Unit No	Syllabus	Teaching Hours
3	1	• Database: ○ Introduction and types ○ Basic terminology (Data (structured and unstructured), Information, field, record, file) ○ Three levels of Architecture (external, conceptual and internal) ○ Database Schema • DBMS: ○ Introduction, Components, advantages, disadvantages, applications ○ Structure of DBMS	10

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Architecture of DBMS ● RDBMS: ○ Introduction and applications ○ Basic terminology (relation, tuple, attribute, domain) ○ E. F. Codd Rules ○ Difference between DBMS and RDBMS ● Data Models: ○ Introduction ○ Types (Hierarchical, Network and Relational, Entity Relationship, Object based)	
2		● Normalization: ○ Concept, need/Advantages and disadvantages ○ Types of Normal forms (1NF, 2NF, 3NF, BCNF) ● Relational Model: ○ Concept, advantages, disadvantages ○ Relationship and its types ○ Various Data constraints ○ Concept of keys and its types (Super Key, Candidate key, primary key, alternate key, foreign key) ● Relational Algebra: ○ Concept and uses ○ Fundamental Operators (selection, projection, intersection, union, minus)	10
3		● SQL: ○ Introduction and applications ○ Datatypes, operators and expressions ○ Concept of CRUD operations ○ Query and subquery (definition, concept and example) ● SQL Commands: ○ Concept and uses ○ Various categories of SQL Commands ▪ DDL (Data Definition Language) ● Concept and uses ● DDL commands (create, drop, alter, truncate) ▪ DML (Data Manipulation Language) ● Concept and uses ● DML commands (insert, update, delete)	10

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		▪ DQL (Data Query Language) • Concept and uses • DQL command (select) ▪ DCL (Data Control Language) • Concept and uses • Creating user • DCL commands (grant, revoke) ▪ TCL (Transaction Control Language) • Concept and uses • TCL commands ((commit, rollback, savepoint) • SQL *PLUS: ○ Concept ○ Working with SQL *PLUS	
	4	• SQL Operators: ○ Logical (and, or, in, like, between, exists) ○ Set (union, union all, intersect, minus) • SQL join: ○ Concept and uses ○ Types of join (inner, outer, self) • SQL Role: ○ Concept and uses ○ Commands (create role, alter role, drop role, grant, revoke) • SQL Functions: ○ Numeric Function (abs, ceil, exp, floor, greatest, max, min, round, sqrt) ○ Character Function (chr, concat, initcap, lower, upper, ltrim, rtrim, trim, replace, substr) ○ Date Function (add_months, last_day, months_between, next_day, round (date), sysdate, systimestamp, trunc (date), to_date, to_char) ○ Aggregate function (Sum, Count, Avg, Max, Min)	15
Practical			30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Suggested Reading:

Reference Books: No.	Name	Author / Publication
1	Oracle Database the Complete Reference	Bob Bryla, Kevin Loney –Oracle Press
2	Oracle Database SQL	Jason Price –Oracle Press

Web site References:

<https://www.geeksforgeeks.org/sql-tutorial/>

<https://www.javatpoint.com/sql-tutorial>

<https://www.tutorialspoint.com/sql/index.htm>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

Course Level	5.0	Internal Marks	50
Programme	Bachelor of Computer Application	External Marks	50
Semester	III	Practical Internal	0
Category of Course	MDC-3	Practical External	0
Course Credit	IV	Prac. External Exam Duration	-
Teaching Hours	Theory-60 Practical-0	Total	100
Course Code		Exam Duration	2:00 Hrs
Course Title	Mathematics		

Course Objectives:

1. To impart the knowledge of mathematical concepts to learners
2. To make learners aware about the possible application of mathematics to problem solving

Course Learning Outcomes:

1. Gaining the knowledge of mathematical computations
2. To be able to solve the computational problems using practical mathematical implementation

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
3	1	• Set Theory: ○ Introduction and types ○ Representation of set ○ Properties ○ De 'Morgan laws with proof ○ Operations (Union, intersection, Difference, Complement, Cartesian products (up to two sets)) ○ Typical examples • Co-ordinate Geometry: ○ Introduction ○ Quadrants & Axes ○ Distance between two points in R²(without proof)	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Section formula (without proof) ○ Area of triangle (without proof) ○ Typical examples	
	2	● Matrices: ○ Introduction ○ Different types of matrix (square matrix, column matrix, row matrix, Diagonal matrix. Unit matrix, null matrix) ○ Transpose of matrix ○ Addition, subtraction & multiplication of two matrices ○ Adjoint of a square matrix ○ determinant of matrices up to order 3 ○ Inverse of matrix	15
	3	● Data Analysis: ○ Frequency Distribution: ▪ Definition and concept ▪ Graphs (Histogram, Bar Graph and Pie Chart) ▪ Table (ungrouped, grouped) ○ Measures of Central Tendency: ▪ Definition and concept ▪ Median (ungroup data, group data) ▪ Mode (ungroup data, group data) ▪ Range ○ Measure of dispersion: ▪ Definition and concept ▪ Mean deviation ▪ Standard deviation ▪ Quartile Deviation	15
	4	● Probability: ○ Definition, concept and applications ○ Terms (Sample Space, experiment, event, outcome) ○ Probability of an event and its types ○ Different Probability Formulas with example	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Suggested Reading:

Reference Books:No.	Name	Author / Publication
1	Business Mathematics	Sancheti & Kapoor by Sultan & Chand
2	Statistical Method	Gupta by Sultan & Chand

Website References:

<https://www.geeksforgeeks.org/maths/>

<https://www.tutorialspoint.com/statistics/index.htm>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

SEMESTER- IV

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Course Level	5.0	Internal Marks	50
Programme	Bachelor of Computer Application	External Marks	50
Semester	IV	Practical Internal	0
Category of Course	Major-8	Practical External	0
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory-60 Practical-0	Total	100
Course Code		Exam Duration	2:00 Hrs
Course Title	Programming in Java (Theory)		

Course Objectives:

1. To impart the knowledge of Java language components and to teach how to use them together in building applications
2. To make the learners aware about design and implementation aspects of java OOP platform
3. To impart the know how about how GUI can be created using java

Course Learning Outcomes:

1. Having ample knowledge about the design and development of problem solutions in java
2. Being able to develop the stand-alone applications in java
3. Developing capability of creating GUI based applications

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
4	1	• overview: ○ History and Features of Java ○ JDK, JVM and JRE ○ JDK Tools ○ JIT compiler ○ Java IDE (NetBeans and Eclipse) ○ Byte code and machine code • Basic building blocks:	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Data Type (Integer, Float, Character, Boolean) ○ Java Tokens (Keyword, Literal, Identifier, Whitespace, Separators, Comments) ○ Operators (Arithmetic, Relational, Boolean Logical, Bitwise Logical, Assignment, Unary, Shift, Special operators) ● Basics of Java programming: ○ Writing, Compiling and Executing basic Java Program ○ Java variable and scope of variables ○ Decision Statements (if, switch) ○ Looping Statements (for, while, Do-While) ○ Jumping Statements (break, continue, return) ○ Array (One Dim., Rectangular, Jagged) ○ Command Line Argument ● OOP Concepts: ○ Definition and concepts of Class, Object, Encapsulation, Inheritance, Polymorphism ○ Creating and using Class with members ○ Static and Non-Static Members ○ Constructor ○ finalize () method ○ Constructor overloading and Method overloading	
	2	● Inheritance: ○ Definition, concept and types ○ Universal Class (Object Class) ○ Access Specifiers (public, private, protected, default, private protected) ○ Constructors in inheritance ○ Method Overriding ● Interface: ○ Definition and concept ○ Defining Multiple Interface in a single program ○ Execution of interface in simple application ○ implementing Hybrid Inheritance program using Interface ● Nested and Inner Class ● Abstract and Final Class	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		• Normal import and Static Import • Java API packages and important classes: ○ Introduction to API packages ○ Various packages (java.lang, java.util, java.io, java.net, java.awt, java.awt.event, java.applet, java.swing) ○ java.lang Package Classes (Math, Wrapper Classes, String, String Buffer, Number, Package) ○ java.util Package Classes (Random, Date, GregorianCalendar, Vector, HashTable, StringTokenizer, SimpleTimeZone, Stack, Scanner) ○ Creating and Using User Defined package and sub-package • Exception Handling: ○ Definition and concept ○ try, catch, finally, throw, throws ○ Creating user defined Exception class	
	3	• Threads: ○ Definition, concept and life cycle (Various states) ○ Thread Class and its methods ○ Multithreading implementation and Synchronization ○ Deamon Thread, Non-Deamon Thread • Stream: ○ Introduction ○ Types (Input, Output, Character, Byte) • Applets: ○ Introduction to Applet ○ Applet Life Cycle ○ Implement & Executing Applet with Parameters ▪ Playing Audio Example ○ Graphics class • Layout Managers: ○ FlowLayout ○ BorderLayout	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

		○ CardLayout ○ GridLayout ○ GridBagLayout ○ Introduction to other layouts(BoxLayout, GroupLayout) ○ Using NO LAYOUT Manager	
	4	● Creating GUI using swing: ○ Introduction to AWT and Swing ○ Difference Between AWT and Swing ○ Swing Components (JFrame, JPanel, JLabel, JButton, JRadioButton, JCheckBox, JTextField, JPasswordField, JTextArea, JScrollBar, JComboBox, JList, JToggleButton, JTabbedPane, JSlider, JProgressBar, JTextPane) ○ Menus (JMenuBar, JMenu, JMenuItem) ● Event handling: ○ Introduction and concept ○ Event Delegation Model ○ Event Packages (AWT Event Package, Swing Event Package) ○ Event Classes (ActionEvent, ItemEvent, FocusEvent, MouseEvent, MouseWheelEvent, TextEvent) ○ Listener Interfaces (ActionListener, ItemListener, FocusListener, KeyListener, MouseListener, MouseMotionListener, TextListener, WindowListener) ○ Adaptor Classes (FocusAdaptor, KeyAdaptor, MouseAdaptor, MouseMotionAdaptor)	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Suggested Reading:

Reference Books: No.	Name	Author / Publication
1	Java: A Beginner's Guide	Herbert Schildt
2	Java The Complete Reference	Herbert Schildt
3	The Java Programming Language	Ken Arnold, James Gosling, David Holmes

Web site References:

<https://www.tutorialspoint.com/java/>

<https://www.w3schools.com/java/>

<https://www.javatpoint.com/java-tutorial>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Course Level	5.0	Internal Marks	0
Programme	Bachelor of Computer Application	External Marks	0
Semester	IV	Practical Internal	50
Category of Course	Major-9	Practical External	50
Course Credit	4	Prac. External Exam Duration	2:00 Hrs
Teaching Hours	Theory-0 Practical-120	Total	100
Course Code		Exam Duration	-
Course Title	Programming in Java (Practical)		

Course Objectives:

1. To impart the knowledge of Java language components and to teach how to use them together in building applications
2. To make the learners aware about design and implementation aspects of java OOP platform
3. To impart the know how about how GUI can be created using java

Course Learning Outcomes:

1. Having ample knowledge about the design and development of problem solutions in java
2. Being able to develop the stand-alone applications in java
3. Developing capability of creating GUI based applications

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
4	1	• overview: ○ History and Features of Java ○ JDK, JVM and JRE ○ JDK Tools ○ JIT compiler ○ Java IDE (NetBeans and Eclipse) ○ Byte code and machine code • Basic building blocks:	30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Data Type (Integer, Float, Character, Boolean) ○ Java Tokens (Keyword, Literal, Identifier, Whitespace, Separators, Comments) ○ Operators (Arithmetic, Relational, Boolean Logical, Bitwise Logical, Assignment, Unary, Shift, Special operators) ● Basics of Java programming: ○ Writing, Compiling and Executing basic Java Program ○ Java variable and scope of variables ○ Decision Statements (if, switch) ○ Looping Statements (for, while, Do-While) ○ Jumping Statements (break, continue, return) ○ Array (One Dim., Rectangular, Jagged) ○ Command Line Argument ● OOP Concepts: ○ Definition and concepts of Class, Object, Encapsulation, Inheritance, Polymorphism ○ Creating and using Class with members ○ Static and Non-Static Members ○ Constructor ○ finalize () method ○ Constructor overloading and Method overloading	
	2	● Inheritance: ○ Definition, concept and types ○ Universal Class (Object Class) ○ Access Specifiers (public, private, protected, default, private protected) ○ Constructors in inheritance ○ Method Overriding ● Interface: ○ Definition and concept ○ Defining Multiple Interface in a single program ○ Execution of interface in simple application ○ implementing Hybrid Inheritance program using Interface ● Nested and Inner Class ● Abstract and Final Class ● Normal import and Static Import	30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

		• Java API packages and important classes: ○ Introduction to API packages ○ Various packages (java.lang, java.util, java.io, java.net, java.awt, java.awt.event, java.applet, java.swing) ○ java.lang Package Classes (Math, Wrapper Classes, String, String Buffer, Number, Package) ○ java.util Package Classes (Random, Date, GregorianCalendar, Vector, HashTable, StringTokenizer, SimpleTimeZone, Stack, Scanner) ○ Creating and Using User Defined package and sub-package • Exception Handling: ○ Definition and concept ○ try, catch, finally, throw, throws ○ Creating user defined Exception class	
	3	• Threads: ○ Definition, concept and life cycle (Various states) ○ Thread Class and its methods ○ Multithreading implementation and Synchronization ○ Deamon Thread, Non-Deamon Thread • Stream: ○ Introduction ○ Types (Input, Output, Character, Byte) • Applets: ○ Introduction to Applet ○ Applet Life Cycle ○ Implement & Executing Applet with Parameters ▪ Playing Audio Example ○ Graphics class • Layout Managers: ○ FlowLayout ○ BorderLayout ○ CardLayout ○ GridLayout ○ GridBagLayout ○ Introduction to other layouts(BoxLayout,	30

BHAKTA KAVI NARSINH MEHTA UNIVERSITY**Major/Minor/Multidisciplinary****Syllabus of B.C.A.(Honors) as per NEP-2020****Faculty of Science****Effective from June 2024****Subject: Computer Science****SEMESTER-III & IV**

		SpringLayout, GroupLayout) ○ Using NO LAYOUT Manager	
	4	• Creating GUI using swing: ○ Introduction to AWT and Swing ○ Difference Between AWT and Swing ○ Swing Components (JFrame, JPanel, JLabel, JButton, JRadioButton, JCheckBox, JTextField, JPasswordField, JTextArea, JScrollBar, JComboBox, JList, JToggleButton, JTabbedPane, JSlider, JProgressBar, JTextPane) ○ Menus (JMenuBar, JMenu, JMenuItem) • Event handling: ○ Introduction and concept ○ Event Delegation Model ○ Event Packages (AWT Event Package, Swing Event Package) ○ Event Classes (ActionEvent, ItemEvent, FocusEvent, MouseEvent, MouseWheelEvent, TextEvent) ○ Listener Interfaces (ActionListener, ItemListener, FocusListener, KeyListener, MouseListener, MouseMotionListener, TextListener, WindowListener) ○ Adaptor Classes (FocusAdaptor, KeyAdaptor, MouseAdaptor, MouseMotionAdaptor)	30

Suggested Reading:

Reference Books: No.	Name	Author / Publication
1	Java: A Beginner's Guide	Herbert Schildt
2	Java The Complete Reference	Herbert Schildt
3	The Java Programming Language	Ken Arnold, James Gosling, David Holmes

Web site References:<https://www.tutorialspoint.com/java/><https://www.w3schools.com/java/><https://www.javatpoint.com/java-tutorial>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

Course Level	5.0	Internal Marks	25
Programme	Bachelor of Computer Application	External Marks	50
Semester	IV	Practical Internal	25
Category of Course	Major-10	Practical External	0
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory-45 Practical-30	Total	100
Course Code		Exam Duration	2:00 Hrs
Course Title	DBMS II		

Course Objectives:

1. To make the learners aware about various database operations
2. To impart the know-how of how to combine database languages with procedural language
3. To disseminate the information about database backup and security

Course Learning Outcomes:

1. Enhancement in the knowledge and understanding of Database analysis and design
2. Having capability to develop procedural blocks to manipulate and use data
3. Developing understanding about the backup and recovery practices
4. Having know how about database authorization and security aspects

Course Content

Sem	Unit No.	Syllabus	Teaching Hours
4	1	• SQL View: ○ Definition and concept ○ Creating, Updating and deleting view • SQL Sequence: ○ Concept and features ○ Creating, updating, deleting and using Sequence • SQL Synonym: ○ Definition and Concept ○ Creating, updating and deleting Synonym • SQL Index:	10

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

		○ Definition and Concept ○ Types (Primary, secondary, cluster) ○ Advantages and disadvantages of indexing ● Database link: ○ Definition and Concept ○ Creating and using database link ● SQL Cluster: ○ Definition and Concept ○ Creating cluster ○ Advantages and disadvantages of using cluster ● SQL Snapshot: ○ Definition and Concept ○ Types ○ Creating snapshot ○ Advantages and disadvantages of using snapshot	
2		● PL/SQL: ○ Concept and Features ○ PL/SQL Block structure ○ Datatypes, operators and expressions ○ Variables, constants and literals ○ Control structures (if-then-else, case, loop, for, while, nested loops) ○ %TYPE and %ROWTYPE ● Stored procedures: ○ Definition and concept ○ Creating, Updating, Deleting and Executing Procedure ● Stored functions: ○ Definition and concept ○ Creating, Updating, Deleting and Executing Function ● Cursor: ○ Definition, concept and types ○ Attributes and operations ○ Cursor For loop ● Database triggers: ○ Definition, concept and types ○ Creating, Updating, Deleting and Executing triggers ● Packages: ○ Definition, concept and types	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Creating, Updating and Deleting packages • Exception Handling: ○ Concept and types ○ General Syntax of exception block ○ Raising exception • PL/SQL Collection: ○ Concept and use ○ Nested tables and Varrays	
	3	• Concurrency Control: ○ Concept and Need ○ Lock: ▪ Concept and need ▪ Types (shared lock, exclusive lock, DML lock, DDL lock, latch) ○ Deadlock (Concept, avoidance, detection and prevention) ○ Blocking (Concept, avoidance and prevention) ○ Lost Update (Concept, avoidance and prevention) • Database Backup and Recovery: ○ Concept and importance ○ Important files (Data file, Redo log file, Control File, Archive File) ○ Backup strategies (full backup, incremental backup, differential backup) ○ Recovery techniques (rollback, forward recovery, point-in-time recovery)	10
	4	• Database Security and Authorization: ○ Concept and Need ○ Database security threats and vulnerabilities ○ User Authentication techniques ▪ Concept ▪ Username and password authentication ▪ Biometric authentication ▪ Certificate based authentication ▪ Operating System authentication ○ Authorization mechanisms ▪ Concept ▪ Access control at different levels (Database, object, statement, row) ▪ Techniques (Access Control Lists, User role,	10

BHAKTA KAVI NARSINH MEHTA UNIVERSITY**Major/Minor/Multidisciplinary****Syllabus of B.C.A.(Honors) as per NEP-2020****Faculty of Science****Effective from June 2024****Subject: Computer Science****SEMESTER-III & IV**

		- Grant/Revoke Statements) ○ Encryption and decryption techniques (Single key, public key, hashing, application-level encryption) ● Database auditing and monitoring: ○ Database auditing ▪ Concept and purpose ▪ Techniques (SQL Profiling and Monitoring, Transaction Logging, third party solutions) ○ Database monitoring ▪ Concept and purpose ▪ Techniques (Security and Compliance Monitoring, storage monitoring, Query Performance Monitoring, Performance Metrics Monitoring)	
Practical			30

Suggested Reading:

Reference Books: No.	Name	Author / Publication
1	Oracle Database the Complete Reference	Bob Bryla, Kevin Loney –Oracle Press
2	Oracle Database SQL	Jason Price –Oracle Press

Web site References:<https://www.geeksforgeeks.org/sql-tutorial/><https://www.javatpoint.com/sql-tutorial><https://www.tutorialspoint.com/sql/index.html>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: Computer Science**SEMESTER-III & IV**

Course Level	5.0	Internal Marks	25
Programme	Bachelor of Computer Application	External Marks	50
Semester	IV	Practical Internal	25
Category of Course	Minor-3	Practical External	0
Course Credit	4	Prac. External Exam Duration	-
Teaching Hours	Theory-45 Practical-30	Total	100
Course Code		Exam Duration	2:00 Hrs
Course Title	Programming with C#.Net		

Course Objectives:

1. To impart the knowledge of fundamental c# programming on .net platform
2. To teach the learners how to make windows and console programming on .net platform
3. To teach the learners to create the applications making use of underlying database

Course Learning Outcomes:

1. Having understanding of working with c# on .net platform
2. Enhancement in understanding of OOP concepts in developing stand alone applications
3. Capability to develop the console and GUI applications using C# .Net

Course Contents

Sem	Unit No.	Syllabus	Teaching Hours
4	1	• .Net Framework: ○ Introduction and features ○ Architecture ○ Components (CLR, CTS, CLS, BCL, FCL, IL, Metadata, Namespace, Assembly, JIT and its types, Reflection, Garbage collection) ○ Managed Code and Unmanaged Code • Visual Studio:	10

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: **Computer Science****SEMESTER-III & IV**

		○ Introduction and features ○ IDE ○ Types of Projects in IDE (Console, Windows, Web, Setup, etc.) ● Basics of C#: ○ Data Types (Value Type & Reference Type) ○ Boxing and UnBoxing ○ Operators (Arithmetic, Relational, Bitwise, etc.) ○ Arrays (One Dimensional, Rectangular, Jagged) ○ Strings (mutable and immutable) ○ Decisions (If types and switch case) ○ Loops (for, while, do..while, foreach) ○ Structures ○ Creating Pointer (Unsafe Code)	
	2	● OOP Concepts: ○ Concept of Class, Object, Encapsulation, Inheritance, Polymorphism ○ Creating Class and Objects ○ Methods with “ref” and “out” parameters ○ Static and Non-Static Members ○ Constructors and destructors ○ Inheritance ▪ Concept and types ▪ Sealed Class & Abstract Class ▪ Overriding Methods ○ Polymorphism ▪ Definition and concept ▪ Types (Static, dynamic) ▪ Implementation of static polymorphism by overloading Constructor, Method and Operator ▪ Implementation of dynamic polymorphism by method overriding ○ Interface ▪ Definition and concept ▪ Implementation ● Creating and using Property ● Creating and using Delegates (Single / Multicasting) ● Creating and using Events with Event Delegate	10

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of **B.C.A.(Honors)** as per NEP-2020Faculty of **Science**

Effective from June 2024

Subject: Computer Science**SEMESTER-III & IV**

		• Collections (ArrayList, HashTable, Stack, Queue, SortedList)	
	3	• Windows programming: ○ Creating windows Application ○ MessageBox With DialogResult class ○ Basic Introduction to Form and properties ○ Adding various Events with event parameters ○ Different Windows Controls (Button, Label, TextBox, RadioButton, CheckBox, ComboBox, ListBox, PictureBox, ScrollBar, TreeView, Menu (MenuStrip, ContextMenuStrip), ToolStrip, Timer, Panel and GroupBox) ○ Dialog Boxes (ColorDialog, FontDialog, SaveFileDialog and OpenFileDialog) ○ MDI Concept with MDI Notepad (RichTextBox) ○ Concept of inheriting forms	10
	4	• Database Programming with ADO.NET: ○ Concept of Connected and Disconnected Architecture ○ ADO.NET Architecture ○ Data Providers in ADO.NET ○ Connection Object ○ Connected Architecture ▪ Command, DataReader ○ Disconnected Architecture ▪ DataAdapter ,DataSet , DataTable , DataRow , DataColumn , DataRelation , DataView ○ Data Binding ○ GridView Programming • User Controls: ○ Creating User Control with Property, Method, Event ○ Using User Control in Windows, Projects as component • Crystal Reports: ○ Creating Crystal Reports ○ Types of Reports ○ Report Sections ○ Formula, Special Field and Summary in Report • Setup Project: ○ Creating Setup Project ○ File System Editor	15

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

		○ User Interface Editor ○ Launch Conditions Editor	
Practical			30

Suggested Reading:

Reference Book No.	Name	Author / Publication
1	Pro C# 5.0 and .NET 4.5 Framework	Andrew Troelsen
2	C#.NET Programming Black Book	steven holzner –dreamtech publications
3	Programming in C#	E Balagurusamy

Website References:

<https://www.tutorialspoint.com/csharp>

<https://www.tutorialsteacher.com/csharp/csharp-tutorials>

<https://www.javatpoint.com/c-sharp-tutorial>

BHAKTA KAVI NARSINH MEHTA UNIVERSITY**Major/Minor/Multidisciplinary****Syllabus of B.C.A.(Honors) as per NEP-2020****Faculty of Science****Effective from June 2024****Subject: Computer Science****SEMESTER-III & IV**

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	25
2	Class Test	05
3	Open book exam/test	05
4	Open note exam/test	05
5	Self-test/ Online test	05
6	Essay/Article writing	05
7	Quizzes/Objective test	05
8	Class assignment	05
9	Home assignment	05
10	Reports Writing	05
11	Research/Dissertation	05
12	Case Studies	05
13	Viva/Oral exam	05
14	Group Discussion	05
15	Role Play	05
16	Paper presentation/Seminar	05
17	Language Lab work	05
18	Interview	05
19	Craft work	05
20	Co-curricular work	05
21	Field Assignment	05
22	Poster Presentation	05
23	Attendance	05
24	Project Work	05
	Total	50

Note: Sr.No.1 is mandatory. Select any five from Sr.No.2 to 24. Each Contains five marks. Student should secure 18 Marks for passing in internal Exam.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

Major/Minor/Multidisciplinary

Syllabus of B.C.A.(Honors) as per NEP-2020

Faculty of Science

Effective from June 2024

Subject: Computer Science

SEMESTER-III & IV

Paper Style (For the subject with credit 4)

Ques. No.	Particulars	From which Unit	Marks
1	Questions (Any Two Out Of Four)	1	10
2	Questions (Any Two Out Of Four)	2	10
3	Questions (Any Two Out Of Four)	3	10
4	Questions (Any Two Out Of Four)	4	10
5	Questions (Any Two Out Of Four)	From Each Unit	10
		Total Marks	50
