



Seva Mandal Education Society's  
Smt. Kamlaben Gambhirchand Shah Department of Computer Applications  
under  
**Dr. Bhanuben Mahendra Nanavati College of Home Science**  
NAAC Re-Accredited 'A+' Grade with CGPA 3.69 / 4  
UGC Status: College with Potential for Excellence  
'Best College Award 2016-17' adjudged by S.N.D.T. Women's University  
Smt. Parmeshwari Devi Gordhandas Garodia Educational Complex  
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## **PROGRAMME: BACHELORS IN COMPUTER APPLICATIONS**

### **Program Objectives**

1. The B.C.A. program aims to produce trained professionals in software industry for Global competency
2. To develop skilled manpower in the various areas of information technology like: Data base management, Software Development, Computer-Languages, Software engineering, Web based applications etc.
3. Acquire the knowledge, skills, experience and values to become lifelong learners able to obtain employment in a computer-related field or pursue higher studies.
4. To create an objective platform for women who would like to work independently as software developers or system analysts for any modern developing systems.

### **Program Outcome**

Upon Graduation, the students will:

1. Develop the necessary Technical, Scientific as well as Problem Solving skills to analyse & solve real world problems within their work domain
2. Develop a thorough understanding of the nature, scope and application of computer and computer languages
3. Develop the ability and mindset to continuously update & innovate
4. Possess strong foundation for higher studies
5. The students will be professionally qualified to be employed in IT sector and Government jobs.

### **Program Specific Outcome**

BCA programme has been designed to prepare graduates for attaining the following specific outcomes:

1. An ability to enhance the application of knowledge of theory subjects in diverse fields

2. Develop language proficiency to handle corporate communication demands
3. Preparing students in various disciplines of technologies such as computer applications, computer networking, software engineering, web designing, JAVA, database concepts and Internet programming.
4. In order to enhance programming skills of the young IT professionals, the concept of project development in using the technologies learnt during the semester has been introduced.

### **Eligibility**

Candidates seeking admission for the B.C.A. course must have passed

Higher Secondary School Certificate Examination held at the end of XII standard conducted by the Maharashtra State Board of Higher Secondary Board or an Examination of another State or Board recognized as equivalent thereto with an aggregate not less than 45% (40% for candidates belonging to Reserved category).

OR

Three-year full time Diploma in Engineering of Technical Education Board with an aggregate not less than 45%.

OR

Three-year full time Diploma in Engineering of Technical Education Board with an aggregate not less than 60% are directly eligible for SYBCA.

### **SEMESTER - III ( SECOND YEAR)**

Code	Subject	Course	L	Pr./ Tu	Cr	Ext. Exam.	Int. Exam.	Total Marks
BCA301	Introduction to Microprocessor	CC	2	2	4	50	50	100
BCA302	Mathematics 2 : Computer Oriented Numerical Methods	CC	2	2	4	50	50	100
BCA303	Computer Organization and Architecture	CC	4	-	4	50	50	100
BCA304	Databse Management System	CC	4	-	4	50	50	100
BCAL305	Python Programming LAB	SEC	-	2	2	25	25	50
BCAL306	Databse Management System LAB	CC	-	2	2	25	25	50
	<b>Total</b>				<b>20</b>			<b>500</b>

CC: Core Courses SEC : Skill Enhancement Courses

<b>SEMESTER-III</b>	<b>1 Credit=25 Marks Total Credits = 20 Total Marks = 20*25=500</b>
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**COURSE: INTRODUCTION TO MICROPROCESSOR**  
**CREDIT - 04**

**Objectives:**

- To understand architecture and features of typical Microprocessor.
- To Study the working of Microprocessor with IO Devices and Interruption Signals.
- To understand the need of microcontrollers in real life applications.
- To learn interfacing of real world peripheral devices
- To study various hardware and software tools for developing applications.

**Learning Outcomes:**

The student will learn:

- Importance of microcontroller in designing embedded application.
- Use of hardware and software tools
- Working of microprocessor and how it communicates with IO Devices and handles different interrupts.

Code No.	Course	TC	Th C	Pr /tuts C	Int	Ext	Total
BCA301	Introduction to Microprocessor	4	2	2	50	50	100

Module No.	Objective	Content	Evaluation
1	To introduce the microprocessor based system and the role of microprocessor	Introduction to Microprocessor Technologies used in microprocessor Different phases in the execution Process Microprocessor architecture and its Operation	0 Marks
2	To learn the features, architecture, pin diagram of Intel 8085	Features of 8085 Architecture of 8085 Pin Diagram of 8085 Interrupt Structure and Operation I/O Memory Bus Instruction Cycle	Test 25 Marks
3	To learn the instruction sets and write programs	Instruction Classification Instruction and data format Instruction set of 8085 Addressing Modes Assembly Language Programming	Viva / 20 Marks
4	To learn the concepts of 8085 and 8259 microcontroller interrupts and its types	The 8085 Interrupts 8085 Vectored Interrupts Additional I/O Concepts and Processes Architecture and pin diagram of 8259	Class Test 25 Marks

<b>5</b>	To Learn IO/Memory connection, data transfer and classification of serial data communication	Input output Techniques, IO Ports IO Data Transfer Techniques IO Interfacing Techniques  Classification of serial data communication Basic serial communication Data formats I2C(Inter Integrated Circuit)	Viva 10 Marks
<b>6</b>	To learn about microprocessor based software development system and assemblers	Microprocessor based Software development System Operating System and Programming Tools Assemblers and cross Assemblers Writing program using cross assemblers	Viva 10 Marks

**EVALUATION:**

- 1) On Six Modules of 50 marks
- 2) Final examination of 50 marks
- 3) Total marks = Internal 50 + External 50 = 100 Marks

**REFERENCE BOOKS:**

1. Amar K Ganguly, A. G. (2012). *Microprocessor and Microcontrollers 8085, 8086 and 8051*. Mumbai: Narosa Publication House.
2. Borole, P. (2014). *8085 Microprocessor Architecture and Programming*. Chennai: Ane Book Pvt Ltd.
3. Gaonkar, R. S. (2013). *microprocessor architecture programming and applications with the 8085*. Mumbai, India: Penram International Publishing.
4. Godse, A. P. (2007-2008). *Microprocessor and Microcontroller System*. Pune, India: Technical Publication.
5. Mukhopadhyay, A. K. (2012). *Microprocessor, Microcomputer and their Application* (4th Edition ed.). Mumbai: Narosa Publishing House.

**COURSE: MATHEMATICS 2 : COMPUTER ORIENTED NUMERICAL METHODS**  
**CREDIT : 4**

**Objectives:**

- 1 To demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
- 2 To derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

**Learning Outcomes:**

The students will be able to :

- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Classify and select the numerical methods.
- Derive Newton's Forward and Backward Interpolation Formula and apply it for solving the problems.
- Find approximate values of the first and second order derivatives of continuous functions.

Code No.	Course	TC	Th C	Tu C	Int	Ext	Total
BCA302	Mathematics 2: Computer Oriented Numerical Methods	4	2	2	50	50	100

Module No	Objective	Content	Evaluation
1	Students will learn <ul style="list-style-type: none"> <li>• The basics of the theory of error</li> <li>• To solve system of equations</li> </ul>	<b>Floating Point Arithmetic and Errors</b> Floating Point Arithmetic Significant Digits Rounding off Errors Absolute and Relative Errors Truncation Errors  <b>Direct and Indirect Solution of Linear Equations</b>  Matrix Inversion Method Gauss Elimination Method Gauss Jacobi Method Gauss Seidel Method (Indirect solution of Linear Equations is added)	Online Test <b>(5 Marks)</b>  Writing an algorithm and Flowchart <b>(5 Marks)</b>
2	The students will learn how to find the root of the equations and solve differential equations.	<b>Roots of Non-Linear Equations</b> Bisection Method Regula-Falsi Method Newton-Raphson Method Ramanujan's Method  <b>Numerical Solution of Differential Equations</b> Euler's Method Runge Kutta Method of order 2 Taylor's Method	Online Test <b>( 5 Marks)</b>  Unit Test <b>(10 Marks)</b>
3	The students will learn how to apply various interpolation methods to approximate functions.	<b>Interpolation</b> Finite Differences Newton- Gregory Forward and Backward Interpolation Lagrange's Interpolation Newton's Divided Difference	Unit Test <b>(15 Marks)</b>
4	The students will be familiar with different types of numeric derivatives and will be able to find the numerical value of an integral	<b>Numerical Differentiation</b> Differentiating Newton Forward and Backward Interpolation Formula <b>Numerical Integration</b> Trapezoidal Rule Simpson's 1/3 <sup>rd</sup> Rule Simpson's 3/8 <sup>th</sup> Rule	Class Test <b>(10 Marks)</b>

**EVALUATION:**

- 1) On Four Modules of 50 marks
- 2) Final examination of 50 marks
- 3) Total marks = Internal 50 + External 50 = 100 Marks

**REFERENCE BOOKS:**

1. S.S. Sastry(2012). *Introductory Methods of Numerical Analysis* ( 5 ed.). PHI Learning.
2. E. Balagurusamy(2017). *Numerical Methods*(5 ed). Mc Graw Hill
3. Sarkar U., & Jalan A. K. (2015). *Numerical Methods: A Programming Based Approach* (1 ed.). Orient Black Swan.
4. Ascher U. M., Greif C. (2012). *A First Course in Numerical Methods*. PHI.
5. JAIN M K and R. K. Jain(2003) *Numerical Methods for Scientific and Engineering Computation* (4 ed.) New Age International Limited
6. Atkinson K. (2008). *An Introduction to Numerical Analysis* (2 ed.) John Wiley& Sons Inc., UK

**COURSE: COMPUTER ORGANISATION AND DESIGN****CREDIT : 4****Objectives:**

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- To explain the function of each element of a memory hierarchy.
- To identify and compare different methods for computer I/O module.
- To develop an understanding of designing digital logic circuit based networks using various techniques.

**Learning Outcomes:**

The students will be able to:

- Analyze the performance of commercially available computers.
- Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
- Students will analyze and synthesize logic networks and logical processes using traditional techniques (such as K-maps and state tables) and various circuits respectively.

Code No.	Course	TC	Th C
BCA303	Computer Organisation and Design	4	4

Module No.	Objective	Content	Evaluation
1	Students will understand the structure formats functions and various characteristics of a computer system.	<b>1.1 Computer Structures:</b> roduction of computer system, Computer Organisation concepts, Basic instruction cycle (Fetch & Execute), Interrupts, Instruction Cycle with interrupts, Multiple Interrupts, Interconnection structure, Bus structure, System Bus, Elements of Bus design	

2	Students will learn various characteristics, types and module organisation of computer memory.	<b>2.1 Internal memory:</b> Characteristics of memory system, Memory hierarchy, Memory Module organization, Cache Memory, Principle, Elements of cache design (Size, Mapping, Replacement, Write policies, Block size), Error detecting & correcting code	Written Unit Test (Marks 25)
3	Students will study the differences between various I/O modules with the help of flowcharts, design issues of I/O modules and also DMA.	<b>3.1. Input/Output:</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Access to I/O devices</li> <li>• I/O Modules Functions</li> <li>• Programmed I/O</li> <li>• Interrupt driven I/O</li> <li>• Direct Memory Access <ul style="list-style-type: none"> <li>o Drawbacks of Programmed &amp; interrupt I/O</li> </ul> </li> </ul>	Viva (Marks 10)
4	Students will develop an understanding of designing a digital logic circuit based system	<b>4.1.Digital Logic Circuits:</b> Introduction to digital signals, Logic Gates Universal gates, Implementation of Universal gates using basic gates	Assignments will be given for the above topics. (Marks 5)
5	Students will analyze and synthesize logic networks using traditional techniques (such as K-maps and state tables)	<b>5.1.Boolean Algebra:</b> Boolean Laws, Simplification of Boolean expression using Laws, Min terms (SOP), Max terms (POS), K-map (2,3 and 4 variables), Don't care conditions. <b>5.2.Truth tables:</b> Simplification of Boolean expression using Truth Tables	Online Test will be conducted for the above topics. (Marks 10)
6	Students will analyze logic processes and implement logical operations using combinational logic circuits and sequential circuits.	<b>6.1.Combinational Circuits:</b> Multiplexers (MUX) (using Basic gates) (4:1) - Designing of Higher Mux using Lower Mux a. 4:1 using 2:1 De-Multiplexer (De-MUX) (using Nand gates) a. 1:4 Designing of Higher demux using lower demux a. 1:4 using 1:2 <b>6.2.Sequential Circuits:</b> Flip Flops, Counters, Registers	Online Test will be conducted for the above topics. (Marks 10)

**EVALUATION:**

- 1) On Four Modules of 50 marks
- 2) Final examination of 50 marks
- 3) Total marks = Internal 50 + External 50 = 100 Marks

**REFERENCE BOOKS:**

1. A.P.Godse, D. (2010). *Computer Organization And Architecture*. Technical Publications Pune.
2. Jain, R. P. (2008). *Modern Digital Electronics*. McGraw-Hill Higher Education.
3. Kai Hwang, N. J. (2010). *Advanced Computer Architecture*. New Delhi: Tata McGraw Hill Education Pvt. Ltd.
4. Mano, M. M. (2016). *Digital Logic and Computer Design*. Pearson India Education Services Pvt. Ltd.



5. Palan, N. G. (2000). *Logic Circuits: Digital Electronics*. Technova Publications, 2000.
6. Stallings, W. (2016). *Computer Organization & Architecture*. Pearson Education India.

**COURSE: DATABASE MANAGEMENT SYSTEMS****CREDIT: 4****Objectives:**

- To introduce students to database management systems
- To familiarize students with the concepts of organizing, maintaining and retrieving information from a DBMS efficiently and effectively
- To explain the concepts of relational data model, Entity relationship model, relational algebra and SQL.

**Learning Outcomes:**

Students will able to

- Describe the fundamental elements of relational database management systems
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
- Improve the database design by normalization.

Code No.	Course	TC	Th C	Tu C	Int	Ext	Total
BCA404	DATABASE MANAGEMENT SYSTEMS	4	4	-	50	50	100

Module No.	Objective	Content	Evaluation
1	Students will learn basic concepts of database and its architecture	<b>Introduction to databases</b> <ul style="list-style-type: none"> <li>● What is database system?</li> <li>● Purpose of Database system</li> <li>● Characteristics of the Database Approach</li> <li>● Relational Databases</li> <li>● Implications of database system</li> <li>● Database System Architecture</li> <li>● Advantages of using DBMS</li> <li>● Database design and ER Model</li> </ul>	Unit Test-1 (Marks-25)
2	Students will learn key constraints used while writing sql queries and how	<ul style="list-style-type: none"> <li>● Indexing</li> <li>● Relational database model</li> <li>● Logical view of data</li> <li>● keys</li> </ul>	



	to improve database design by using normalization.	<ul style="list-style-type: none"> <li>● Integrity rules</li> <li>● Relational Database design</li> <li>● features of good relational database design</li> <li>● Normalization (1NF, 2NF, 3NF, BCNF)</li> </ul>	Online Test (Marks-15)
3	Students will learn how to transform a query in a high-level declarative language (such as SQL) into a correct and efficient execution strategy.	<b>3.Query Processing</b> <ul style="list-style-type: none"> <li>● What is a query</li> <li>● the steps of processing a query</li> <li>● Relational Algebra:</li> <li>● Query trees</li> <li>● Query optimization</li>   <li>● Materialisation:</li> <li>● Pipelining</li> <li>● Cost estimation / Measure of query cost</li> </ul>	
4	Students will learn: <ul style="list-style-type: none"> <li>● Concepts of transaction processing systems.</li> <li>● Types of schedules and various techniques required to control concurrency control of database.</li> </ul>	<b>4.Transaction Processing Concepts</b> <ul style="list-style-type: none"> <li>● Introduction, Transaction and System Concepts</li> <li>● Desirable properties of transaction</li> <li>● Schedules and Recoverability,</li> <li>● Serializability of Schedules,</li> <li>● Locking Techniques for Concurrency Control</li> </ul>	Assignment (Marks-10)

**EVALUATION:**

- 1) On Four Modules of 50 marks
- 2) Final examination of 50 marks
- 3) Total marks = Internal 50 + External 50 = 100 Marks

**REFERENCE BOOKS:**

- 1) Bayross, I. (2010). SQL, PL/SQL the Programming Language of Oracle (4th ed.).
- 2) Deshpande, P. (1 January 2011). SQL & PL/SQL for Oracle 11g Black Book. Dreamtech Publisher.
- 3) Elmasri Ramez, N. S. (2010). Fundamentals of Database System. Pearson.
- 4) Harper, M. M. (16 Dec 2014). Oracle Database 11g PL/SQL Programming. McGrawHill Publication.
- 5) James Groff (Author), P. W. (July 2017). SQL The Complete Reference (Third ed.). McGraw Hill.
- 6) Negi, M. C. (2019). Fundamental of Database Management System. BPB Publications.

**COURSE: PYTHON PROGRAMMING****CREDIT : 2****Objectives:**

- To help students understand why Python is a useful scripting language for developers.
- To enable the students to learn how to design and program Python applications.
- To define the structure and components of a Python program.
- To learn how to use Lists, Tuples, and Dictionaries in Python programs.

**Learning Outcomes:**

The students will be able to

- Describe the Maths Functions, Strings, List, Tuples and Dictionaries in Python.
- Express different Decision-Making statements and Functions.
- Interpret Object Oriented Programming in Python.
- Design and program Python applications

Code No.	Course	TC	Th C	Pr C	Int	Ext	Total
BCSL405	Python Programming	2	-	2	25	25	50

Module No	Objective	Content	Evaluation
1	Students will be able to: <ul style="list-style-type: none"> <li>● Understand the relevance of Python as a Scripting Language for Developers.</li> <li>● To design and program Python Applications.</li> <li>● To write Loops and Decision Statements in Python.</li> </ul>	<p style="text-align: center;"><b><u>THE WAY OF THE PROGRAM</u></b></p> <p><b>1.1. INTRODUCTION</b> Python Programming Language, History, Features, Comparison with other programming languages, Installing Python, Running Python program, Debugging: Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference between Brackets, Braces, and Parentheses, Python IDE (Pycharm), Starting with Pycharm and understanding its basics.</p> <p><b>1.2. VARIABLES AND EXPRESSIONS</b> Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations.</p> <p><b>1.3. CONDITIONAL STATEMENTS, LOOPING AND CONTROL STATEMENTS</b> if, if-else, nested if –else, for, while, nested loops, Terminating loops, skipping specific conditions</p>	Viva will be conducted. (Marks 5)

2	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Write Functions and pass Arguments in Python.</li> <li>• Define the Structure and Components of a Python program.</li> </ul>	<p><b>2.1 FUNCTIONS</b> Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types</p> <p><b>STRINGS</b> A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.</p>	Quiz on Using ICT Tool EDMODO (Marks 5)
3	<p>Students will be able to learn:</p> <ul style="list-style-type: none"> <li>• To use Lists, Tuples, and Dictionaries in Python programs.</li> <li>• To read and write files in Python.</li> <li>• To use Exception Handling in Python Applications for Error Handling.</li> </ul>	<p><b>3.1 LISTS</b> Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods</p> <p><b>3.2 TUPLES AND DICTIONARIES</b> Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions</p> <p>Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods</p> <p><b>3.3 FILES AND EXCEPTIONS</b> Text Files, The File Object Attributes, Directories, Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions, Concept of regular expression, various types of regular expressions, using match function.</p>	Assignment will be given on the topic (Marks 5)

<b>4</b>	Students will learn to: <ul style="list-style-type: none"> <li>● Design Object-Oriented programs to Python classes.</li> <li>● Use Class Inheritance, Method Overriding, Data Encapsulation in Python for reusability.</li> </ul>	<b>4.1 CLASSES AND OBJECTS</b> Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values  <b>4.2 CLASSES AND METHODS</b> Inheritance, Method Overriding, Data Encapsulation, Data Hiding.	Practical Test (Marks 10)
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**EVALUATION:**

- 1) On Four Modules of 25 marks
- 2) Final Practical Examination of 25 marks
- 3) Total marks = Internal 25 + External 25 = 50

**REFERENCE BOOKS:**

1. Downey, A. B. (2012). Think Python (1ed.). USA: O'Reilly Media, Inc.
2. Paul, G., Jennifer, C., & Jason, M. (2018). Practical Programming: An Introduction to Computer Science Using Python 3.6 (1 ed.). USA: Shroff/O'Reilly.
3. Balagurusamy, E. (2016). Introduction to Computing and Problem Solving using Python (1 ed.). Coimbatore: Mcgraw Hill.
4. Michael, U. (2017). Murach's Python Programming (1 ed.). USA: Shroff/Murach.
5. Kenneth, A. L. (2015). Fundamentals of Python. Washington: Custom Hardside.
6. Lutz, M. (2013). Learning Python. O'Reilly
7. Severance, C. (2017). Python for Everybody. Shroff

**COURSE: DATABASE MANAGEMENT SYSTEMS LAB****CREDIT: 2****Objectives:**

- To help a student to develop skills for the design and implementation of database application.
- To train the students to execute various SQL commands.
- To help students design the database schema with the use of appropriate data types for storage of data in database.
- To understand & implement security and integrity policies relating to databases

**Learning Outcomes:**

The students will be able to:

- Design the database schema with the use of appropriate data types for storage of data in database.
- Understand the uses of the database schema and need for normalization.
- Implement security and integrity policies relating to databases.

Code No.	Course	TC	Th C	Pr C	Int	Ext	Total
BCAL406	DATABASE MANAGEMENT SYSTEMS LAB	2	-	2	25	25	50

Module No.	Objective	Content	Evaluation
1	<p>Students will learn:</p> <ul style="list-style-type: none"> <li>● To write basic SQL queries.</li> <li>● Types of data constraints.</li> </ul>	<p><b>1.1.Implementation Data Definition Language</b></p> <ul style="list-style-type: none"> <li>● Create Table</li> <li>● Alter Table</li> <li>● Drop Table</li> <li>● Rename Table</li> </ul> <p><b>1.2 Implementation Data Constraints</b></p> <ul style="list-style-type: none"> <li>● Domain Integrity Constraints</li> <li>● Entity Integrity Constraints</li> <li>● Referential Integrity Constraints</li> </ul>	Students will be evaluated using Lab Manual. (Marks 15)
2	<p>Students will learn:</p> <ul style="list-style-type: none"> <li>● To manipulate data using different SQL queries.</li> <li>● Basic operators used in SQL.</li> </ul>	<p><b>2.1 Data Manipulation Language</b></p> <ul style="list-style-type: none"> <li>● Select</li> <li>● Insert</li> <li>● Update</li> <li>● Delete</li> </ul> <p><b>2.2 Types of Operators</b></p> <ul style="list-style-type: none"> <li>● Arithmetic Operator</li> <li>● Logical Operator</li> <li>● Comparison Operator</li> <li>● Special Operator</li> <li>● Set Operator</li> </ul>	Practical Class Test will be conducted. (Marks 10)
3	<p>Students will understand how to use different functions while executing SQL queries.</p>	<p><b>3.1 Different types of Functions</b></p> <ul style="list-style-type: none"> <li>● Aggregate Functions</li> <li>● Numeric Functions</li> <li>● Character Functions</li> <li>● Conversion Functions</li> <li>● Date Functions</li> </ul>	
4	<p>Students will learn to :</p> <ul style="list-style-type: none"> <li>● Access data from various tables by using joins.</li> <li>● Apply restrictions on database tables.</li> </ul>	<p><b>4.1 Types of JOINS</b></p> <ul style="list-style-type: none"> <li>● Equi Join</li> <li>● Non Equi Join</li> <li>● Self-Join</li> </ul> <p><b>4.2 Subqueries.</b></p> <p><b>4.3 Data Control Language of SQL</b></p> <ul style="list-style-type: none"> <li>● Grant</li> <li>● Revoke</li> <li>● Commit</li> <li>● Rollback</li> <li>● Save point</li> </ul> <p><b>4.4 Implementation of views</b></p>	Final Practical Exam will be conducted. (Marks 25)

**EVALUATION:**

- 1) On Four Modules of 25 marks
- 2) Final examination of 25 marks
- 3) Total marks = Internal 25 + External 25 = 50

**REFERENCE BOOKS:**

- 1) Bayross, I. (2010). SQL, PL/SQL the Programming Language of Oracle (4th ed.).
- 2) Deshpande, P. (1 January 2011). SQL & PL/SQL for Oracle 11g Black Book. Dreamtech Publisher.
- 3) Elmasri Ramez, N. S. (2010). Fundamentals of Database System. Pearson.
- 4) Harper, M. M. (16 Dec 2014). Oracle Database 11g PL/SQL Programming. McGrawHill Publication.
- 5) James Groff (Author), P. W. (July 2017). SQL The Complete Reference (Third ed.). McGraw Hill.
- 6) Negi, M. C. (2019). Fundamental of Database Management System. BPB Publications.

