Savitribai Phule Pune University

(Formerly University of Pune)

Three Year B.Sc. Degree Program in B.C.A.

(Faculty of Science & Technology)

F.Y.B.C.A.

Choice Based Credit System Syllabus

To be implemented from Academic Year 2019-2020

Title of the Course : Bachelor of Computer Applications (BCA)

Preamble of the syllabus

The B.C.A. program is a combination of computer and applied courses from science stream. The computer related courses introduce techniques of programming, databases, web designing, system analysis, design tools and different computing environments. The applied courses include mathematics, statistics and electronics that provide theoretical foundation for the learner.

Objectives:

- To produce knowledgeable and skilled human resources that is employable in IT and ITES.
- To impart knowledge required for planning, designing and building Complex Application Software Systems as well as to provide support for automated systems or applications.
- To produce entrepreneurs

Introduction

The Program is of Three Years duration with six semesters. It is a Full Time Degree Program. The program will be based on Choice-based credit system comprising 140 credit points.

Lateral Entry to SYBCA

Any candidate who has passed three Year Diploma course in Computer Engineering/Technology/Information Technology/Electronics Communication/ Electronics Telecommunications/ Electronics approved by the DTE, Maharashtra State or Equivalent authority is eligible for admission to direct second year (SYBCA) of this program.

TABLE -1 Structure for FYBCA (Semester_1)									
Semester 1									
Course Code	**Course**	**Teaching Scheme Hours / Week**			**Examination Scheme and Marks**			**Credit**	
		Theory	**Tutorial**	**Practical**	**CE**	**End-Sem**	**Total**	**TH**	**PR**
BCA111	Fundamentals of Computers	04	--	--	30	70	100	04	--
BCA112	Problem Solving and C Programming	04	--	--	30	70	100	04	--
BCA113	Applied Mathematics	04	--	--	30	70	100	04	--
BCA114	Business Communication	04	--	--	30	70	100	04	--
BCA115	Fundamentals of Computers Laboratory	--	--	03	15	35	--	50	1.5
BCA116	C Programming Laboratory	--	--	03	15	35	--	50	1.5
BCA117	Applied Mathematics Laboratory	--	--	03	15	35	--	50	1.5
BCA118	Business Communication Laboratory	--	--	03	15	35	--	50	1.5
							Total Credits	**16**	**06**
Total		**16**	**--**	**12**	**180**	**420**	**600**	**22**	

Abbreviations:

TW: Term Work **TH:** Theory **OR:** Oral **TUT**: Tutorial **PR**: Practical

TABLE -2 Structure for FYBCA (Semester_2)									
Semester 2									
Course Code	**Course**	**Teaching Scheme Hours / Week**			**Examination Scheme and Marks**			**Credit**	
		Theory	**Tutorial**	**Practical**	**CE**	**End-Sem**	**Total**	**TH**	**PR**
BCA121	Computer Organization	04	--	--	30	70	100	04	--
BCA122	Advanced C Programming	04	--	--	30	70	100	04	--
BCA123	Operating Systems Concepts	04	--	--	30	70	100	04	--
BCA124	Database Management Systems – I	04	--	--	30	70	100	04	--
BCA125	Computer Organization Laboratory	--	--	03	15	35	050	--	1.5
BCA126	Advanced C Programming Laboratory	--	--	03	15	35	050	--	1.5
BCA127	Operating Systems Laboratory	--	--	03	15	35	050	--	1.5
BCA128	Database Management Systems - I Laboratory	--	--	03	15	35	050	--	1.5
							Total Credits	**16**	**06**
Total		**16**	**--**	**12**	**180**	**420**	**600**	**22**	

Detailed Syllabus :

SEMESTER I

BCA111: Fundamentals of Computer

Teaching Scheme:	Credits	Examination Scheme:
Theory: 04 Hrs/Week	04	Continuous Evaluation: 30 Marks End-Semester : 70 Marks

Pre-requisite Course: **None**

Companion Course: **BCA115: Fundamentals of Computer Laboratory**

Course Objectives:

- To study the basics of Computer System
- To learn how to configure computer devices
- To Learn Basic Commands of Operating system and application software
- To understand Open Source Software

Course Outcomes:

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

- Define working of computers and peripherals, types of software and languages
- Troubleshoot the computer systems and use utility software
- Choose commands and features of operating systems and application software
- Use open source software

Course Contents

Unit I	Introduction to Computer System	08 Hrs

Introduction– Characteristics of Computers, Basic structure and operation of a computer, functional units and their interaction, Types of computers and features- Mini Computers, Micro Computers, Mainframe Computers, Super Computers, Laptops and Tablets,
Types of Programming Languages- Machine Languages, Assembly Languages, High Level Languages
Translators- Assembler, Compiler, Interpreter
Data Organization- Drives, Directories and Files
Number Systems - Introduction to Binary, Octal, Hexadecimal system, Conversion, Addition, Subtraction, Multiplication, Division

Unit II	Computer Peripherals	08 Hrs

Primary storage devices – RAM, ROM, PROM, EPROM

Secondary Storage Devices – HDD, CD, DVD, Pen drive

I/O Devices- Keyboards, Scanners, Digitizers, Plotters, LCD, Plasma Display,

Pointing Devices –Mouse, Joystick, Touch Screens

Introduction to Network devices – Hubs, Switches, Routers, NAS, MODEM, Access Points

Unit III	Computer Software	08 Hrs

Types of software: System Software, Application Software.

System Software: Operating System. Types of O.S., Basic Commands in Linux – ls, pwd

Introduction to GUI: Desktop Icons, File and Directory structure, Menu Items, Control Panel, File and Directory Search
Utility programs: Anti-plagiarism software, Anti-virus, Disk Cleaning, Defragmentation, Compression/Decompression of files.
Application software: Examples of commercial software with brief introduction

Unit IV	Editors, Word Processors, Spreadsheets & Presentation Tools	08 Hrs

Editors and Word Processors: Features and functionalities, examples of basic and advanced editors like notepad, vi and Emacs, Introduction to desktop publishing – Features and functionalities
Spreadsheets: Features and functionalities, Spreadsheet Applications
Introduction to Google Apps: Google Docs, Sheets and Forms and its applications
Presentation Tools: Design Slides (using Text, images, charts, clipart), Slide Animation, Template and theme creation

Unit V	Open Source Software	08 Hrs

Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, Problems with traditional commercial software, Open Source Development Model and Licenses, History, Initiatives, Principles, methodologies and Philosophy
Open Source Operating Systems: GNU/Linux, Android, Free BSD, Open Solaris. Technologies, Development tools, IDEs, LAMP
Example Open Source Projects: Apache web server, GNU/Linux, Android, Mozilla (Firefox), Wikipedia, Drupal, Wordpress, GCC, github, Open Office.

Unit VI	PC Hardware & Trouble Shooting	08 Hrs

Introduction to Computer Hardware - Motherboard, CPU, Basic Input and Output Setting (BIOS), Network Interface Card (NIC), Graphics card
Logical Fault Isolation – ADJUST method, Common Networking Problems, Tools for gathering information, Troubleshooting PC hardware

Reference Books:

1. P.K. Sinha &Priti Sinha, “Computer Fundamentals”, 3rd edition, BPB pub.
2. Sumitabha Das, “Unix Concepts and Applications”, Tata McGraw Hill Education
3. Join Josh, “PC/HARDWARE” O’Reilly Publication.
4. Open Source Initiative: https://opensource.org/
5. Wikipedia: https://en.wikipedia.org/
6. Github: https://help.github.com/

SEMESTER I

BCA112: Problem Solving and C Programming

Teaching Scheme: Theory: 04 Hrs/Week	Credits 04	Examination Scheme: Continuous Evaluation: 30 Marks End-Semester : 70 Marks

Pre-requisite Course: None

Companion Course: BCA116 C Programming Laboratory

Course Objectives:

- To provide a broad overview of problem solving techniques
- To learn C programming to solve problems

Course Outcomes:

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

- Define algorithms and explain their characteristics
- Formulate algorithm and draw flow chart to solve a given problem
- Explain use of appropriate data types, control statements
- Demonstrate ability to use top-down program design

Course Contents

Unit I	Problem solving, algorithms and flowcharts	08 Hrs

Types of Problems, Problem solving using computer, Difficulties with problem solving, Problem solving aspects.
Definition & Characteristics of algorithm, Examples of algorithms, Flow charts with examples, Top-down design
Problem solving using Arithmetic Statements, Conditional Statement & Iterative Statements such as Addition/Multiplication, check number is positive/negative, Maximum of 2 numbers & 3 numbers, sum of first n numbers, sum of given n numbers, reverse digits of a number, check whether the number is palindrome, check number is prime, factorial of number, factors of number, GCD, LCM of numbers etc.

Unit II	C Fundamentals	08 Hrs

Introduction to C, Features of C, Structure of C Program, C Character Set, Identifiers and Keywords, Variables and constants
Data types- Basic data types, Enumerated types, Type casting, Declarations, Expressions
Operators and Expressions Unary and Binary arithmetic operators, Increment Decrement operators
Relational and logical operators, Bit wise operators, Assignment operators, Comma operator, size of operator, Ternary conditional operator, Precedence and associativity

Unit III	Input Output Statements	08 Hrs

printf, scanf functions, getchar, putchar, getch functions, gets, puts functions, Escape sequence characters, Format specifiers

Unit IV	Control & Iterative Structures	08 Hrs

If, If- Else Statements, Nested If Statements, Conditional Branching – switch statement, Loop (while, do…while, for), break, continue, goto statements

Unit V	Functions	08 Hrs

Introduction to Functions, Function Arguments, Library & User defined functions, Methods for parameter passing, Recursion, Storage Classes – Auto, Static, Global and Register		
Unit VI	**Arrays**	**08 Hrs**
Introduction, Array Declarations, Bounds Checking, Single dimension Arrays, Two dimension Arrays, Arrays & Function		

Reference Books:

1. Cormen, Leiserson, Rivest, Stein, “Introduction to algorithms”
2. Brian W. Kernighan, Dennis M. Ritchie , “The C Programming Language”, ISBN:9788120305960, PHI Learning
3. R.G. Dromey, “How to Solve it by Computer”, ISBN: 9788131705629, Pearson Education
4. Behrouz A. Forouzan, RichardF. Gilberg, “A Structured Programming Approach Using C”, ISBN:9788131500941, Cengage Learning India
5. E. Balaguruswamy, “Programming in ANSI C”, ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi
6. Maureen Spankle, “Problem Solving and Programming Concepts”, ISBN: 81-317-0711-3
7. Y S Kanetkar, “Let Us C”, BPB Publications

SEMESTER I

BCA113: Applied Mathematics

Teaching Scheme: Theory: 04 Hrs/Week	Credits 04	Examination Scheme: Continuous Evaluation: 30 Marks End-Semester : 70 Marks

Pre-requisite Course: Basic Mathematics

Companion Course: BCA117 Applied Mathematics Laboratory

Course Objectives:

- Learn basic terminology formal logic, proofs, sets, relations, functions and perform the operations associated with same
- Use formal logic proof and logical reasoning to solve problems
- To understand significance of statistical measures
- To study Correlation, Probability and sampling theory

Course Outcomes:

On completion of the course, students will be able to–

- Relate and apply techniques for constructing mathematical proofs and make use of appropriate set operations, propositional logic to solve problems
- Use function or relation models to interpret associated relationships
- Apply basic counting techniques and use principles of probability
- Given a data, compute various statistical measures of central tendency
- Use appropriate Sampling techniques

Course Contents

Unit I	Set Theory and Logic	08 Hrs

Sets– Set Theory, Need for Sets, Representation of Sets, Set Operations, cardinality of set, **Types of Sets** – Bounded and Unbounded Sets, Countable and Uncountable Sets, Finite and Infinite Sets, Countably Infinite and Uncountably Infinite Sets, power set, **Propositional Logic-** logic**,** Propositional Equivalences, Application of Propositional Logic- Translating English Sentences, Proof by Mathematical Induction and Strong Mathematical Induction.

Unit II	Relations and Functions	08 Hrs

Relations: Properties, n-ary Relations and Applications, Representing Relations , Closures of Relations, Equivalence Relations, Partial Orderings, partitions, Hasse Diagram, Lattices, Chains and Anti-Chains, Transitive Closure and Warshall‘s Algorithm

Functions- Surjective, Injective and Bijective functions, Inverse Functions and Compositions of Functions.

Unit III	Counting	08 Hrs

The Basics of Counting, rule of Sum and Product, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, The Pigeonhole Principle.

Unit IV	Data Presentation and Aggregation	08 Hrs

Data Types: attribute, variable, discrete and continuous variable, **Data presentation:** frequency distribution, histogram, ogive, box-plot, bar plots

Mean, Median, Mode, and Other Measures of Central Tendency: Arithmetic Mean (AM), Weighted Arithmetic Mean, Arithmetic Mean Computed from Grouped Data, Concept of Median, Mode, Geometric Mean (GM), Harmonic Mean (HM), Quartiles, Deciles, and Percentiles

Standard Deviation and Other Measures of Dispersion: Standard Deviation, Root Mean Square, Variance, Absolute and Relative Dispersion

Unit V	Correlation Theory and Sampling	08 Hrs

Moments, Skewness and Kurtosis: Moments, Computation of Moments for Grouped Data, Skewness, Kurtosis, Computation of Skewness and Kurtosis.

Correlation: Bivariate data, scatter plots, Linear Correlation, Correlation of Attributes, Coefficient of correlation

Linear regression: Concept, The Least-Squares Method, Regression Lines

Elementary Sampling Theory : Sampling Theory, Random Samples and Random Numbers, Sampling With and Without Replacement, Stratified Sampling

Unit VI	Probability & Hypothesis Testing	08 Hrs

Probability : Random experiment, sample space, events types and operations of events, Probability definition, Axioms (The four Elementary Theorems) of probability (without proof), Conditional probability, 'Bayes' theorem (without proof), Examples, Mathematical Expectations

Standard Distributions: Continuous and discrete, PDF/PMF, Introduction and properties (without proof) for binomial, normal, Standard Normal, chi-square, t, F distributions.

Introduction to Hypothesis testing

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics And Its Applications, Tata Mcgraw-Hill, Isbn 978-0-07-288008-3, 7th Edition.
2. Trivedi, K.S., " Probability, Statistics, Design Of Experiments And Queuing Theory, With Applications Of Computer Science", Prentice Hall Of India, New Delhi
3. C L Liu, "Elements Of Discrete Mathematics", Tata Mcgraw-Hill, Isbn 10:0-07-066913-9.
4. Kulkarni, M.B., Ghatpande, S.B. And Gore, S.D., "Common Statistical Tests" Satyajeet Prakashan, Pune
5. J.N. Kapur And H.C. Saxena, "Mathematical Statistics", S. Chand Publications, 20th Ed.
6. John P. D'angelo & Douglas B. West, "Mathematical Thinking–Problem Solving And Proofs" Prentice Hall, 2nd Ed.

SEMESTER I

BCA114: Business Communication

Teaching Scheme: Theory: 04 Hrs/Week	Credits 04	Examination Scheme: Continuous Evaluation: 30 Marks End-Semester : 70 Marks

Pre-requisite Course: **Basic writing Skills including grammar**

Companion Course: **BCA118 Business Communication Laboratory**

Course Objectives:

- To understand the concept, process and importance of communication.
- To develop an integrative approach where reading, writing, presentation skills are used together to enhance ability to communicate and write effectively.
- To create awareness about Methods and Media of communication.
- To improve job seeking skills.

Course Outcomes:

On completion of the course, students will be able to–

- Apply business communication strategies and principles to prepare effective communication for domestic and international business situations
- Identify ethical, legal, cultural, and global issues affecting business communication.
- Participate in team activities using collaborative work skills.
- Communicate via electronic mail, Internet, and other technologies.
- Deliver an effective oral business presentation

Course Contents

Unit I	Introduction to Communication	08 Hrs

Introduction to Communication, Meaning and Definition, Process of communication and importance, Principles of effective communication, Types of Communication, Scope of Business communication - Internal & External, Barriers to Communication, Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers , Overcoming the barriers

Verbal Communication - Written Communication-Advantages & Limitations (writing a Cover Letter, Memo, Agenda, Notice & Minutes), Oral Communication - Principles of effective oral communication - Techniques of effective speech, Media of oral communication (Face-to-face conversation - Teleconferences - Press Conference - Demonstration - Radio Recording - Dictaphone - Meetings - Demonstration and Dramatization - Public address system - Grapevine - Group Discussion - Oral report – Advantages and Limitations

Non-Verbal Communication - Body Language (Positive & Negative Gestures)handshakes, gazes, smiles, hand movements, styles of working, voice modulations, body sport for interviews; business etiquettes; business dining, business manners of people of different cultures, managing customer care

Unit II	Listening Skills	08 Hrs
Importance, Types of Listening, Barriers to Effective listening, Difference between listening and hearing – active listening, academic listening, listening for details - listening and note-taking, listening for sound contents of videos, listening to talks and descriptions, listening for meaning - listening to announcements (railway/ bus stations/ airport / stadium announcement etc.) ,Listening to Radio and Television, listening to news programmes, Tips for effective listening, 10 Commandments of listening		
Unit III	**Speaking and Presentation Skills**	**08 Hrs**
Interactive nature of communication, importance of context ,formal and informal –set Expressions in different situations ,greeting – introducing - making requests - asking for /giving permission - giving instructions and directions – agreeing / disagreeing - seeking and giving advice - inviting and apologizing telephonic skills - conversational manners Presentation as a skill - prerequisites of effective presentation, format of presentation; Assertiveness – indicators of assertive behaviour, strategies of assertive behavior; elements of presentation strategies – audience – objectives medium- key ideas - structuring the material - organizing content - audio-visual aids - hand-outs - use of power point - clarity of presentation - non-verbal communication -seminar paper presentation and discussion Communication skills for group discussion and interviews		
Unit IV	**Business Correspondence**	**08 Hrs**
Need of Business Correspondence , Components and layout of Business letter, Drafting of letters: Enquiry, Quotation, order , Complaints and follow up , Recovery , Email etiquette, notices, circulars, memos Preparing agenda and writing minutes of meetings, Making notes on Business conversations Effective use of SMS and Case writing and Documentation, Persuasive letter, Proposal, Report Writing Preparing Press Release and Press Notes, Job application letter , Essentials of an impressive Resume		
Unit V	**Creativity and Capacity Building**	**08 Hrs**
Creativity at Workplace: Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method Ethical Values: Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics **Capacity Building**: Learn, Unlearn and Relearn: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building		
Unit VI	**Soft Skills**	**08 Hrs**

Leadership and Team Building: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams,

Decision Making and Negotiation: Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts

Stress and Time Management: Stress, Sources of Stress, Ways to Cope with Stress

Reference Books:

1. McGrath, E.H., “Basic Managerial Skills for All”, PHI, New Delhi
2. Gajendra S. Chauhan, Sangeeta Sharma, “Soft Skills: an Integrated Approach to Maximise Personality”, Wiley India
3. Hamp-Lyons and etal, “Study Writing”, 2nd Edition, Cambridge University Press, 2008.
4. Barun K. Mitra , “Personality Development and Soft Skills”, Oxford Press
5. S.A. Sherlekar , “Modern Business Organization”, Himalaya Publishing”

SEMESTER I

BCA115: Fundamentals of Computers Laboratory

Teaching Scheme:	Credits	Examination Scheme:
Practical: 03 Hrs/Week	1.5	Continuous Evaluation: 15 Marks End-Semester :35 Marks

Companion Course: BCA111: Fundamentals of Computers

Course Objectives:

- To understand installation process to install operating system and applications
- To learn various features of application software

Course Outcomes:

On completion of the course, students will be able to–

- Install operating system and execute various commands
- Effectively use various features of application software
- Create and use spreadsheets effectively
- Prepare effective Presentation

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Program codes with sample output of all performed assignments are to be submitted as softcopy. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Topics for Laboratory Assignments

Sr. No.	Assignment
1	Operating System Commands
2	Spreadsheet
3	Presentation Tool
4	Utility programs, anti-plagiarism software etc
5	Word Processing using Open Office
6	Google Apps, Wordpress, Drupal, Wiki, Github etc

SEMESTER I

BCA116: C Programming Laboratory

Teaching Scheme:	Credits	Examination Scheme:
Practical: 03 Hrs/Week	1.5	Continuous Evaluation: 15 Marks End-Semester :35 Marks

Companion Course: **BCA112 Problem Solving & C Programming**

Course Objectives:

- To learn formulation of algorithm for a given problem
- To study various data types, arrays and functions in C
- To understand input-output and, control and iterative statements in C

Course Outcomes:

On completion of the course, students will be able to–

- Formulate an algorithm and draw flowchart for the given problem
- Implement the given algorithm in C
- Write programs using appropriate data types and control structures in C

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Program codes with sample output of all performed assignments are to be submitted as softcopy. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints.

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Sr. No.	Assignment
1	Assignment on use of data types, simple operators (expressions)
2	Assignment on decision making statements (if and if-else, nested structures)
3	Assignment on decision making statements (switch case)
4	Assignment on use of while loops
5	Assignment on use of for loops
6	Assignment on nested loops
7	Assignment on exit, goto, continue, break
8	Assignment on menu driven programs.

9	Assignment on writing C programs in modular way (use of user defined functions)
10	Assignment on call by value
11	Assignment on call by reference
12	Assignment on recursive functions
13	Assignment on use of arrays (1-D array) and functions
14	Assignment on use of multidimensional array (2-D arrays) and functions
15	Assignment on Standard Library Function

SEMESTER I

BCA117: Applied Mathematics Laboratory

Teaching Scheme:	Credits	Examination Scheme:
Practical: 03 Hrs/Week	1.5	Continuous Evaluation: 15 Marks End-Semester: 35 Marks

Companion Course: BCA113 Applied Mathematics

Course Objectives:

- To provide knowledge about applying theoretical concepts of applied mathematics and statistics to solve problems
- To provide hands-on experience on statistical package

Course Outcomes:

On completion of the course, student will be able to

- Apply mathematical and statistical concepts to solve problems
- Use R to perform statistical operations and data visualization

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Program codes with sample output of all performed assignments are to be submitted as softcopy. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Suggested List of Laboratory Assignments

Applied Mathematics: 2 Assignments each based on following topics	
1	Set Theory
2	Logic, Mathematical Induction
3	Relations
4	Functions
5	Counting
Statistics (Assignments may be performed using R)	
1	Download and Install R, understand IDE
2	Using R execute the basic commands, array, list and frames.

3	Create a Matrix using R and Perform the operations addition, inverse, transpose and multiplication operations.
4	Using R Execute the statistical functions: mean, median, mode, quartiles, range, inter quartile range histogram
5	Using R, drawing scatter Plots, Line Plots, Bar Plots etc
6	Using R import the data from Excel / .CSV file and Perform operations
7	Using R import the data from Excel / .CSV file and Calculate the standard deviation,
8	Using R import the data from Excel / .CSV file and draw the skewness
9	Import the data from Excel / .CSV and perform the Chi-squared Test.

References:

- Richard Cotton, “Learning R”, SPD O’Reilly Publications

SEMESTER I

BCA118: Business Communication Laboratory

Teaching Scheme:	Credits	Examination Scheme:
Practical: 03 Hrs/Week	1.5	Continuous Evaluation: 15 Marks End-Semester: 35 Marks

Companion Course: BCA114 Business Communications

Course Objectives:

- To study different ways for effective listening, writing, reading and presentation
- To learn tools used in business communication

Course Outcomes:

On completion of the course, student will be able to

- Effectively listen to lectures, public announcements and news on TV and radio.
- Engage in telephonic conversation.
- Communicate effectively and accurately in English
- Use spoken language for various purposes
- Demonstrate ability to prepare documents used in business correspondence

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Suggested List of Laboratory Assignments

1	Listening Comprehension Exercise
2	Reading Comprehension & Vocabulary Exercise
3	Role Play I
4	Telephone Conversation
5	Face to Face Conversation
6	Introducing Yourself
7	Thumbnail Portrait
8	Writing Skills - Covering Letter, Resume , Application letter, Report Writing, Proposal Writing ,Email Communication
9	Presentation Skills
10	Group Discussions

11	Mock Interviews
12	Public Speaking activity
13	Leadership Skills and Team Building Activity

References:

- D. Sudha Rani , "Business Communication and Soft Skills Laboratory Manual"

SEMESTER II

BCA121: Computer Organization

Teaching Scheme: **Theory: 04 Hrs/Week**	**Credits** **04**	**Examination Scheme:** **Continuous Evaluation: 30 Marks** **End-Semester : 70 Marks**

Pre-requisite Course: **BCA111 Fundamentals Of Computer**

Companion Course: **BCA125: Computer Organization Laboratory**

Course Objectives:

- To study number system, logic gates
- To understand combinational and sequential circuits
- To provide a broad overview of architecture and functioning of computer systems
- To learn the basic concepts behind the architecture and organization of computers.

Course Outcomes:

On completion of the course, student will be able to–

- Design of combinational circuits
- Design of sequential circuits
- Explain block diagram of CPU, Memory and types of I/O transfers

Course Contents

Unit I	**Data representation and Computers Arithmetic**	**08 Hrs**

Review of Decimal, Binary, Octal, Hexadecimal Number system and their inter-conversion, BCD code, Gray code, Excess-3 code, ASCII , EBCDIC, Unicode, Concept of parity code. Signed and Unsigned numbers, 1's and 2's complement of binary numbers, Binary arithmetic (Addition, subtraction and subtraction using1's complement and 2's complement).

Unit II	**Boolean Algebra & Logic Gates**	**08 Hrs**

Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates

Minterm, Maxterm and Karnaugh Maps:

Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression

Unit III	**Combinational Circuits**	**08 Hrs**

Introduction - Multi-input, multi-output Combinational circuits, Code converters design and implementations
Arithmetic Circuits: Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator

Multiplexer, Demultiplexer, ALU, Encoder and Decoder: Introduction, Multiplexer, De-multiplexer, Decoder, ALU, Encoders

Unit IV	Sequential circuits	08 Hrs

Introduction, Terminologies used, S-R flip-flop, D flip-flop, JK flip-flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, conversion from one type of flip-flop to another, Application of flip-flops.
Counters:
Introduction, Asynchronous counter, Terms related to counters, IC7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Pre-settable counter, IC 7490, IC 7492,
Synchronous counter ICs, Analysis of counter circuits.
Shift Register:
Introduction, parallel and shift registers, Ring counter, Johnson counter

Unit V	CPU, Memory and I/O Organization	08 Hrs

Block diagram of CPU, functions of CPU, general register organization, flags, Concept of RISC and CISC, Introduction to hardwired and micro-programmed CPU.

Memory System hierarchy, Cache Memory, Internal Memory, External Memory, Concept of Virtual Memory.

Input/ Output: types of I/O data transfers - CPU initiated, interrupt initiated and DMA, Need of I/O interfaces, Parallel and serial communication (asynchronous and synchronous data transfer).

Unit VI	Introduction to Microprocessors and Microcontrollers	10 Hours

Block diagram of Pentium, Functional units, Concept of pipeline and parallelism, Programmers model

Introduction to Microcontroller Intel 8051 – Functional block diagram, Introduction to multi-core processors.

Reference Books:

1. R.P. Jain, “Modern Digital Electronics”, McGraw-Hill Publications
2. Flod and Jain, “Digital Fundamentals”, Pearson Publication.
3. Morris Mano, “Computer System Architecture” Prentice-Hall.

SEMESTER II

BCA122: Advanced C Programming

Teaching Scheme: **Theory: 04 Hrs/Week**	**Credits 04**	**Examination Scheme: Continuous Evaluation: 30 Marks End-Semester : 70 Marks**

Pre-requisite Course: **BCA112: Problem Solving and C Programming**

Companion Course: **BCA126: Advanced C Programming Laboratory**

Course Objectives:

- To learn advanced features in C Programming
- To study advanced data types
- To understand built-in library functions

Course Outcomes:

On completion of the course, student will be able to–

- Write programs using pointers, structures and unions
- Use Pre-processor directives
- Manipulate strings using library functions
- Write programs to perform operations on Files

Course Contents

Unit I	**Preprocessor**	**08 Hrs**

Concept, Format of preprocessor directives, File inclusion directives (#include), Macro substitution directives (#define), nested macros, parameterized macros,

Macros versus functions, #error / #pragma directives, Conditional compilation (#if/#ifdef/#else/#elif/#endif), Predefined macros (_DATE_ / _TIME_ /_FILE_ /_LINE_/ _STDC_)

Unit II	**Pointers**	**08 Hrs**

Concept – reference & dereference, Declaration, definition, initialization & use, Types of pointers,

Pointer Arithmetic, Multiple indirection,

parameter passing – call by value and call by reference

Arrays & Pointers - Pointer to array, Array of pointers,

Functions & pointers - Passing pointer to function, Returning pointer from function, Function pointer, Pointers &const

Dynamic memory management, Allocation, Resizing, Releasing, Memory leak / dangling pointers

Unit III	**Strings**	**08 Hrs**

Concept, Declaration, definition, initialization, format specifiers, String literals/ constants & variables – reading & writing from & to console, Importance of terminating NULL character, Strings & pointers

Array of strings & array of character pointers, User defined functions, predefined functions in string.h - strlen , strcpy , strcat , strcmp , strcmpi , strrev , strlwr , strupr , strset , strchr , strrchr , strstr , strncpy , strncat , strncmp , strncmpi , strnset , strtok, Command line arguments – argc and argv

Unit IV	**Structures**	**08 Hrs**

Concept, Declaration, definition, initialization, accessing structure members (. operator), Array of structures, Pointers to structures, Declaring pointer to structure
Accessing structure members via pointer to structure, Structures & functions,
Passing each member of structure as a separate argument, Passing structure by value / address
Nested structures, typedef & structures,

Unit V	**Advanced Features**	**08 Hrs**

Unions - Concept, Declaration, definition, accessing union members, Difference between Structures & unions, structures within union, union within structures, pointers and unions, nested unions, enumerated data types, Bit fields, Concept, need, use, multi-file programs

Unit VI	**File Handling**	**08 Hrs**

Concept of streams, need, Types of files, Operations on text & binary files, Random access file, library functions for file handling – fopen, fclose, fgetc, fseek, fgets, fputc etc

Reference Books:

1. The C Programming Language (Second Edition) – By B. W. Kerninghan& D. M. Ritchie
2. Programming in C – A Practical Approach – By Ajay Mittal (Pearson Publications)
3. Programming with C – By Byron S Gottfried (Schaum's Outlines)
4. A structural Programming Approach using C – By BehrouzForouzan& Richard Gilberg
5. Y S Kanetkar, "Let Us C", BPB Publications

SEMESTER II

BCA123: Operating Systems Concepts

Teaching Scheme:	Credits	Examination Scheme:
Theory: 04 Hrs/Week	04	Continuous Evaluation: 30 Marks End-Semester : 70 Marks

Pre-requisite Course: **BCA111 Fundamentals of Computers**

Companion Course: **BCA127 Operating Systems Laboratory**

Course Objectives:

- To Understand the basic concepts of operating system
- To study Architecture, File systems and basic operating system commands
- To Use of editors and Networking commands.
- To learn Shell Programming and shell scripts.

Course Outcomes:

On completion of the course, student will be able to–

- explain basic concepts of operating system
- use basic Linux commands and Linux documentation
- write shell scripts

Course Contents

Unit I	Introduction	08 Hrs

Introduction to Operating Systems, Different services provided by Operating System to Users.

Introduce the concept of Process, Process States, Process Control Block, User Interface, System Calls.

Introduction to Linux Operating System - Features of Linux, Architecture of the Linux, Introduction to File System and Process Environment.

Working with Linux - The login prompt, General features of commands/ command structure, Command arguments and options.

Understanding of some basic commands such as echo, printf, ls, who, date, passwd, cal, Combining commands

Unit II	Commands & Processes	08 Hrs

What is a Command?, Meaning of Internal and external commands, The type command: knowing the type of a command and locating it, The man command knowing more about commands and using Linux online manual pages. The man with keyword option and whatis

Operating system Processes - Concept, Mechanism of process creation, Parent and child process, The ps command with its options, Executing a command at a specified point of time: at command.

The nice command, Background processes. The bg and fg commands, The kill command, The find command with illustrative example.

Unit III	File System	08 Hrs

Linux files - Naming files. Basic file types,
Organization of files. Standard directories, Parent child relationship, The home directory and the HOME variable.
The PATH variable, manipulating the PATH, Relative and absolute pathnames, Directory commands – pwd, cd, mkdir, rmdir commands, The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names
File related commands – cat, mv, rm, cp, wc and od commands, File attributes and permissions and knowing them, The ls command with options, Changing file permissions: the relative and absolute permissions changing methods

Unit IV	Using Shells and Vi Editor	08 Hrs

What is Shell? Different types of shells, The shells interpretive cycle, Wild cards and file name generation, Removing the special meanings of wild cards, Three standard files and redirection,
Connecting commands: Pipe, The grep, egrep commands. .

Vi Editor - Introduction to the Vi editor, Different ways of invoking and quitting vi, Different modes of vi, Input mode commands, Command mode commands, The ex mode commands, Illustrative examples Navigation commands

Unit V	Security & Networking	08 Hrs

Security Understanding Linux Security, Uses of root, pseudo command, working with passwords, Bypassing user authentication, Understanding ssh

Networking Basic introduction to Networking, Network protocols: http, ftp etc., IP address, DNS

Unit VI	Shell Scripts	08 Hrs

Shell programming - Ordinary and environment variables, The .profile. Read and read only commands, Command line arguments, exit and exit status of a command, Logical operators for conditional execution, The test command and its shortcut.

The if, while, for and case control statements, The set and shift commands and handling positional parameters, The here (<<) document and trap command, Simple shell program examples.

File inodes and the inode structure, File links – hard and soft links. Filters, Head and tail commands.
Cut and paste commands, The sort command and its usage with different options

Reference Books:

1. Unix Concepts and Applications by Sumitabha Das.
2. Operating System Concepts - Siberchatz, Galvin, Gagne (8th Edition)
3. UNIX and Shell Programming, Behrouz A. Forouzan, Richard F. Gilberg : Cengage Learning – India Edition. 2009.
4. Linux Command Line and Shell Scripting Bible, Richard Blum , Christine Bresnahan, 2ndEdition , Wiley,2011

SEMESTER II

BCA124: Database Management Systems – I

Teaching Scheme: Theory: 04 Hours/Week	Credits 04	Examination Scheme: Continuous Evaluation: 30 Marks End-Semester : 70 Marks

Pre-requisite Course: **BCA113 Applied Mathematics**

Companion Course: **BCA128: Database Management Systems – I Laboratory**

Course Objectives:

- To understand the fundamental concepts of database management such as database design, database languages, and database-system implementation
- To study and understand systematic database design approaches
- To learn SQL – the database Query language

Course Outcomes:

On completion of the course, student will be able to–

- Design E-R Model for given requirements and convert the same into database tables.
- Formulate database queries using SQL
- Design a database in appropriate normal form

Course Contents

Unit I	File Organization	08 Hrs

Introduction, Physical / logical files, Record organization (fixed, variable length)
Types of file organization(heap, sorted, indexed, hashed)

Unit II	Introduction of DBMS	08 Hrs

Overview, File system Vs. DBMS, Describing & storing data (Data models - relational, hierarchical, network), Levels of abstraction, Data independence, Structure of DBMS, Users of DBMS, Advantages of DBMS

Unit III	Conceptual Design (E-R model)	08 Hrs

Overview of DB design
ER data model (entities, attributes, entity sets, relations, relationship sets)
Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization), Case studies

Unit IV	Structure of Relational Databases	08 Hrs

Concepts of a table, a row, a relation, a tuple and a key in a relational database
Conversion of ER to Relational model
Integrity constraints (primary key, referential integrity, Null constraint, unique constraint, check constraint)

Unit V	SQL	08 Hrs

Introduction, DDL commands (create, drop, alter) with examples, Basic structure of SQL query, Set operations, Aggregate functions, Null values, Nested Sub-queries, Modifications to Database (insert, delete, update), SQL mechanisms for joining relations (inner joins, outer joins and their types) Examples on SQL (case studies)		
Unit VI	**Relational Database Design**	**08 Hrs**
Pitfalls in Relational-Database Design (undesirable properties of a RDB design like repetition, inability to represent certain information) Functional dependencies (Basic concepts, Closure of set of functional dependencies, Closure of an Attribute set) Concept of a Super Key and a primary key (Algorithm to derive a Primary Key for a relation) Concept of Decomposition, Desirable Properties of Decomposition (Lossless join and Dependency preservation) Concept of Normalization - Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF Examples on Normalization		
Reference Books:		
1. Henry F. Korth, Abraham Silberschatz, S. Sudarshan, “Database System Concepts”, Tata McGraw-Hill Education 2 . Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, McGraw-Hill		

SEMESTER II

BCA125: Computer Organization Laboratory

Teaching Scheme:	Credits	Examination Scheme:
Practical: 03 Hrs/Week	1.5	Continuous Evaluation: 15 Marks End-Semester :35 Marks

Companion Course: **BCA121 Computer Organization**

Course Objectives:

- To study architecture and functioning of computer systems
- To learn the basic concept behind the architecture and organization of computers

Course Outcomes:

On completion of the course, student will be able to–

- Design and implement combinational circuits
- Design and implement sequential circuits
- Translate real world problems into digital logic formulations

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Program codes with sample output of all performed assignments are to be submitted as softcopy. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Suggested Topics for Laboratory Assignments

1	Study of Logic gates and their ICs and universal gates
2	Implement code converters
3	Implement Adder and Subtractor Arithmetic circuits
4	Design and implement combinational circuit based on the problem given and minimizing using K-maps
5	Implement Encoder and Decoder and Multiplexer and De-multiplexers
6	Study of flip-flops and counters Memory Organization
7	Study of counter ICs and designing Mod-N counters

SEMESTER II

BCA126: Advanced C Programming Laboratory

Teaching Scheme: Practical: 03 Hrs/Week	Credits 1.5	Examination Scheme: Continuous Evaluation: 15 Marks End-Semester :35 Marks

Companion Course: BCA122 Advanced C Programming

Course Objectives:

- To learn advanced features in C Programming
- To study advanced data types
- To understand built-in library functions

Course Outcomes:

On completion of the course, student will be able to–

- Write programs using pointers, structures and unions
- Use Pre-processor directives
- Manipulate strings using library functions
- Write programs to perform operations on Files

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Sr. No.	Assignment
1	To demonstrate use of preprocessor directives
2	To demonstrate use of pointers
3	To demonstrate advanced use of pointers
4	To demonstrate concept of strings, array of strings
5	To demonstrate string operations using pointers
6	To demonstrate command line arguments
7	To demonstrate structures (using array and functions)
8	To demonstrate nested structures and Unions
9	To demonstrate use of bitwise operators.
10	To demonstrate file handling

SEMESTER II

BCA127: Operating Systems Laboratory

Teaching Scheme: Practical: 03 Hrs/Week	Credits 1.5	Examination Scheme: Continuous Evaluation: 15 Marks End-Semester :35 Marks

Companion Course: **BCA123 Operating Systems Concepts**

Course Objectives:

- To provide hands-on knowledge for
  - Installation of Linux and Packages
  - Setting environment, use documentation, commands and editors
  - Configure Security and Network environment

Course Outcomes:

On completion of the course, student will be able to–

- Install Linux and packages, configure environment
- Use commands and editors and use documentation
- Configure Security and network environment

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The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

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The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Program codes with sample output of all performed assignments are to be submitted as softcopy. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Suggested List of Laboratory Assignments

1	Linux Installation: a. Install your choice of Linux distribution e.g. Ubuntu, Fedora, Debian. b. Try different installation media like CD/DVD, USB Drive to install. c. Customize desktop environment by changing different default options like changing default background, themes, screensavers.

2	a. Screen Resolution: Ascertain the current screen resolution for your desktop. b. Networking: Get the current networking configuration for your desktop. Are you on a wired or a wireless connection? What wireless networks are available, if any? c. Time Settings Change the time zone of your system. After noting the time change, change the time zone back to your local time zone
3	Installing and Removing Software: a. Install gcc package, run the package and remove it.
4	Documentations: a. Finding Info Documentation: From the command line: bring up the info page for say "sed" command. Study the usage section. b. Finding man pages From the command line: Bring up the man page for the 'ls' command. Study the EXAMPLES section. c. Finding man pages by the given Topic, by the given Section d. From the command line, bring up the man page for the given library function e. Study of Command-Line Help
5	Command line operations: a. Find the passwd file in / using find command b. Create a symbolic link to the file you found e. Create a file say, xyz.txt and move it in /tmp directory using relative pathname. f. Delete the file moved to /tmp in previous step using absolute path. g. Find the location of ls, ps, bash commands.
6	File Operations: a. Explore mounted file systems on your system using different ways b. Archive and backup your home directory using tar, gzip commands. d. Use dd command to create files and explore different options to dd. e. Use diff command to create diff of two files. f. Use patch command to patch a file. Analyze the patch using diff command again.
7	User environment a. Find in which account are you logged in? b. Display /etc/shadow file using cat and understand the importance of shadow file. How it's different than passwd file? c. Get you current working directory. d. Explore different ways of getting command history, how to run previously executed command without typing it? e. Create alias to most commonly used commands
8.	Using Linux Editors: vim/emacs a. Create, modify, search, navigate a file in editor. b. Learn all essential commands such as search, search/replace, highlight, show line
9.	Linux Security: a. Use of sudo to change user privileges to root b. Identify all operations that require sudo privileges c. Create a new user and add it to sudo configuration file. d. Set password for new user. e. Modify the expiration date for new user using password ageing. f. Delete newly added user.

10.	Network: a. Get IP address of your machine using ifconfig. b. If IP is not set, then assign an IP address according to your network settings. c. Get hostname of your machine. d. Use ping to check the network connectivity to remote machines. e. Use telnet/ssh to connect to remote machines and learn the difference between the
11.	Shell Scripting a. Searching with grep: Search for your username in the /etc/passwd file. b. Parsing files with awk: Display in a column a unique list of all the shells used for users in /etc/passwd. Which field in /etc/passwd holds the shell (user command interpreter in the manual page)? How do you make a list of unique entries, that is, no repeated entries? c. Searching and substituting with sed: Search all instances of the user command interpreter (shell) equal to /bin/false in /etc/passwd and substitute with /bin/bash using sed. d. Exit status: write a script which does ls to a non existent file. Display an exit status of the previous command. Now create the file and again display the exit status. In each task send the ls output to /dev/null e. Working with files: Write a shell script which will ask user for a directory, create that directory and switch to it and tell the user where you are using pwd command. Now use touchto create some new files followed by displaying the filenames.

SEMESTER II

BCA128: Database Management Systems – I Laboratory

Teaching Scheme: **Practical: 03 Hrs/Week**	**Credits** **1.5**	**Examination Scheme:** **Continuous Evaluation: 15 Marks** **End-Semester :35 Marks**

Companion Course: BCA124: Database Management Systems – I

Course Objectives:

- To learn design of E-R diagrams
- To prepare and execute database queries

Course Outcomes:

On completion of the course, student will be able to–

- Prepare E-R Diagram for the given problem statement
- Formulate appropriate SQL DDL Queries
- Formulate appropriate SQL DML Queries

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include University syllabus, conduction & Assessment guidelines.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and **handwritten write-up** of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign

Program codes with sample output of all performed assignments are to be submitted as softcopy. Use of DVD containing students programs maintained by lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints

Guidelines for Assessment

Continuous assessment of laboratory work is to be done based on overall performance of student. For each lab assignment, the instructor will assign grade/marks based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Sr. No.	Assignment
1	Case study – ER diagram
2	Case study – ER diagram (with generalization)
3	Case study – ER diagram (with aggregation)
4	Using PostgreSQL (demo of PostgrSQL)
5	Data Definition queries (Create)
6	Data Definition querie (Alter)
7	Data Definition queries (Drop)
8	SQL DML Select queries
9	Queries using joins
10	Aggregate Functions and Group by and Having Clauses
11	Nested Queries
12	Data Manipulation queries (Insert)
13	Data Manipulation queries (Delete)
14	Data Manipulation queries (Update)