Progressive Education Society's

Modern College of Arts, Science and Commerce,

Shivajinagar, Pune 5
(An Autonomous College Affiliated to SavitribaiPhule Pune University)

Syllabus

For B.C.A. (Science)

(2019-20 Course)

(with effect from 2019-20)

CIA: Continuous Internal Evaluation

Semester 1 (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem Exam	Total
CCT-1	19ScBCAU101	Discrete Mathematics-I	4	4	40	60	100
CCT-2	19ScBCAU102	Programming in 'C' and Problem-Solving Methods	4	4	40	60	100
CCT-3	19ScBCAU103	Fundamentals of Statistics	4	4	40	60	100
CCT-4	19ScBCAU104	Fundamentals of Web Technologies (HTML, CSS)	4	4	40	60	100
CCP-1	19ScBCAU105	Lab I: Programming in 'C' and Problem-Solving Methods	2	2	40	60	100
CCP-2	19ScBCAU106	Lab II: Fundamentals of Web Technologies (HTML, CSS)	2	2	40	60	100
CCP-3	19ScBCAU107	Lab III: Advanced Spreadsheet Concepts	2	2	40	60	100
Total				22	120	180	300
SECT-1	19CpPedU101	Physical Education – I	1	0.5	20	30	50
	Extra Credentials	Activity Based Learning –I (MOOC or IIT Spoken Tutorial like courses) Introduction to Computers, HTML					

Semester 2 (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem Exam	Total
CCT-5	19ScBCAU201	Discrete Mathematics-II	4	4	40	60	100
CCT-6	19ScBCAU202	Advanced 'C' Programming	4	4	40	60	100
CCT-7	19ScBCAU203	Computer Organization	4	4	40	60	100
CCT-8	19ScBCAU204	Database System-I (Postgre SQL)	4	4	40	60	100
CCP-4	19ScBCAU205	Lab I: Advanced 'C' Programming	2	2	40	60	100
CCP-5	19ScBCAU206	Lab II: Database System-I (PostgreSQL)	2	2	40	60	100
CCP-6	19ScBCAU207	Lab III: Discrete Mathematics Tutorial	2	2	40	60	100
Total				22	120	180	300
SECT-2	19CpPedU201	Physical Education – II	1	0.5	20	30	50
	Extra Credentials	Activity based Learning -II (MOOC or IIT Spoken Tutorial like courses), Programming in 'C'					

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU101
Course Name: Discrete Mathematics-I

Teaching Scheme: TH: 4Lectures/Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable Prerequisite:

Basic knowledge of mathematical concepts is desirable

Course Objectives:

- Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contra positives using truth tables and the properties of logic.
- Determine the domain and range of a discrete or non-discrete function
- Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.

Course Outcomes:

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

- Enhance his/her ability to reason and to present a coherent and mathematically accurate argument
- Apply basic counting techniques to solve combinatorial problems

Chapter No.	Title	Lectures
Chapter 1	**Sets**	**10**
	1.1 Sets, Subsets	
	1.2 Operations on sets	
	1.3 De Morgan's Laws	
	1.4 Power Set of Set	
	1.5 Cartesian Product	
	1.6 Partition of a Set	
	1.7 Partial Order on a Set	
Chapter 2	**Language and proofs**	**15**
	2.1 Quantifiers and Logical Statements	
	2.2 Truth tables, Logical connections	
	2.3 Compound Statements	
	2.4 Predicates	

	2.5 Elementary Proof Techniques	
Chapter 3	**Relations and Functions**	**15**
	3.1 Ordered pairs, Cartesian Product	
	3.2 Relations types of relations, Partial Ordering	
	3.3 Injective, Subjective, Bijective Function	
	3.4 Composition of two functions, Inverse function	
Chapter 4	**Combinatorial Reasoning**	**10**
	4.1 Arrangements and Selections	
	4.2 Binomial Coefficients	
	4.3 Permutations	
	4.4 Functional Digraphs	
Chapter 5	**Divisibility**	**9**
	5.1 Factors and Factorization	
	5.2 The Euclidean Algorithm	
	5.3 The Dart Board Problem	
	5.4 Polynomials	
	EXPERIENTIAL LEARNING	1

Reference books:

1. Discrete Mathematics and Application by Kenneth Rosen, **ISBN-13:** 978-0072899054

2. Elements of Discrete Mathematics by C.L. Liu, **ISBN-13:** 978-0071005449

3. Concrete Mathematics by Graham, Knuth and Patashnik, **ISBN-13:** 978-0201558029

Course Code: 19ScBCAU102
Course Name: Programming in 'C' and Problem Solving Methods

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable Prerequisite:
- Fundamentals of Mathematics
- Understanding of Computer systems (Input-Process-Output)

Course Objectives:
- To learn the use of 'C' programming language to solve basic assignments

Course Outcomes:

On completion of the course, student will be able to–
- Design algorithms
- Write basic programs in 'C' language as listed in the related Lab Book

Course Contents

Chapter No.	Title	Lectures
Chapter 1	**Introduction to Programming languages and problem solving**	**4**
	1.1 Requirement of solving problems 1.2 Problem solving aspects 1.3 Programming Languages 1.4 Translators, Compilers, Interpreters	
Chapter 2	**Algorithms and Flowcharts**	**6**
	2.1 Definition & Characteristics of algorithm 2.2 Simple examples on algorithms 2.3 Flow charts 2.4 Simple examples on flowcharts	
Chapter 3	**Introduction to C Programming**	**6**

	3.1 Introduction to C language 3.2 Features of C 3.3 Structure of C Program 3.4 Simple Programs	
Chapter 4	**Arithmetic Problem Solving and Statements**	**3**
	4.1 Simple Arithmetic operations 4.2 Statements, Conditional Statement & Iterative Statements	
Chapter 5	**C Language Fundamentals**	**5**
	5.1 Character Set, Identifiers and Keywords 5.2 Variables and Constants 5.3 Data types- Basic data types, Enumerated types 5.4 Type casting 5.5 Declarations, Expressions	
Chapter 6	**Operators and Expressions**	**7**
	6.1 Unary plus and minus operators 6.2 Binary arithmetic operators 6.3 Pre and Post Increment, Decrement operators 6.4 Relational and logical operators 6.5 Bit wise operators 6.6 Shift Operators: Left, Right 6.7 Assignment operators 6.8 Comma operator, size of operator 6.9 Ternary conditional operator 6.10 Precedence and associatively	
Chapter 7	**Data Input Output Statements**	**5**
	7.1 printf, scanf functions 7.2 getchar, putchar, getch functions 7.3 gets, puts functions 7.4 Escape sequence characters 7.5 Format specifiers	
Chapter 8	**Control Statements**	**8**
	8.1 If, If- Else Statements 8.2 Nested If Statements 8.3 Conditional Branching – switch statement 8.4 Loop (while, do…while, for) 8.5 break, continue, goto statements	
Chapter 9	**Functions**	**8**
	9.1 Introduction to Functions 9.2 Function Arguments	

	9.3 Library functions (Math, String…) and User defined functions 9.4 Methods of Calling Function 9.5 Recursive and non-recursive functions 9.6 Storage Classes	
Chapter 10	**Arrays**	**7**
	10.1 Introduction 10.2 Array Declarations 10.3 Bounds Checking 10.4 Single dimensional Arrays, Two dimensional Arrays, Multi-dimensional Arrays 10.5 Passing Array to Function 10.6 Examples	
	EXPERIENTIAL LEARNING	1

Reference Books:

1. The C Programming Language, Brian W. Kernighan, Dennis M.

   Ritchie,PHI Learning,ISBN:9788120305960

2. How to Solve it by Computer, R.G. Dromey, Pearson Education, ISBN: 9788131705629

3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India, ISBN:9788131500941

4. Programming in ANSI C, E. Balaguruswamy, Tata Mc-Graw   Hill Publishing Co Ltd.-New Delhi, ISBN: 9781259004612

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU103
Course Name: Fundamentals of Statistics

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable prerequisite:
Basic understanding of Statistical concepts

Course Objectives:
- To understand and master the concepts, techniques & applications of Statistical Methods.
- To develop the skills of solving real life problems using Statistical methods.
- To make students understand the art of applying statistical techniques to solve real-life problems
- To gain knowledge of Statistical Computations
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Course Outcome:
- Perform statistical analysis

Chapter 1	Introduction to Statistics	10

	1.1 Presentation of data
	    1.1.1 Concept of frequency,
	    Frequency distribution, cumulative
	      frequency, graphical presentation of
	      data (histogram, frequency curve,
	      Ogive curve)
	1.2 Measures of Central tendency
	    Concept of central tendency, different
	      measures of central tendencies
	      (arithmetic mean, median, mode)
	      partition values
	1.3 Measures of Dispersion
	      Concept of dispersion, different
	      measures of Dispersion (range, quartile
	      deviation, variance, standard
	      deviation, Coefficient of
	      variation(c.v.))
	1.4 Examples and problems	

Chapter 2	**Correlation and Regression**	**10**

	2.1 Concept of Bivariate data
	2.2 Correlation Concept and definition,
	    types of correlation, Scatter diagram,
	    Karl's Pearson's correlation
	coefficient
	    and statements of its properties
	2.3 Linear Regression
	    Concept, lines of regression,
	    coefficient of regressions
	    and statements of its properties
	2.4 Examples and problems	

Chapter 3	**Standard Probability Distributions**	**10**

	3.1 Concept of random variable, discrete
	    random variable with examples.
	Probability mass function, Mean and
	    variance of a discrete random variable,
	    Examples and problems
	3.2 Binomial distribution
	p.m.f., problems on computing
	    probabilities, mean and
	    variance
	3.3 Poisson distribution
	p.m.f., problems on computing
	    probabilities, mean and
	    variance	

Chapter 4	**Normal Distribution**	**15**

	4.1 Introduction
	    Concept of continuous
	    random variable with examples
	4.2 Probability Density Function of
	    Normal Distribution with Mean μ and
	    Variance σ
	4.3 Standard normal Variate and its
	    properties (without proof)
	4.4 Additive properties of two
	   independent
	    normal Variates (without proof)
	4.5 Problems on evaluation of
	   probabilities
	    and find mean and variance
	4.6 Examples and problems	

Chapter 5	**Testing of Hypothesis**	**14**
	5.1 Large sample test	

	5.1.1 Concept of hypothesis, null hypothesis, alternative hypothesis, Type I and Type II error, Level of significance, Test of significance, critical region & acceptance region, P-value
	5.1.2 Concept of large sample test for testing
	5.2 Small sample tests
	    5.2.1 Chi- square test of goodness of fit
	    5.2.2 Chi- square test of independence of two attributes
	    5.2.3 t- test for testing
	Ho: $\mu = \mu_0$ v/s H1 :$\mu \neq \mu_0$
	Ho :$\mu_1 = \mu_2$ v/s H1 : $\mu_1 \neq \mu_2$
	Paired t- test
	t- test of significance of correlation coefficient Ho : $p = 0$ v/s HA: $p \neq 0$
	5.2.4 Examples and Problems	

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Reference Books:

1) S.C. Gupta -Fundamentals of Statistics, ISBN-13: 978-8183183390

2) J.S Chandran -Statistics for Business and Economics, ISBN 978-1-5230-9514-8

3) S. P Gupta -Statistical Methods, ISBN-13: 978-0074634981

4) S.C Gupta, Gupta Indra -Business Statistics, ISBN: 8183184170

5) Amir D Aczel, JayavelSounderpandian -Complete Business statistics, ISBN-13: 978-0077108601

6) D.N. Elhance -Fundamentals of Statistics, ISBN-13: 978-8122500332

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU104
Course Name:Fundamentals of Web Technologies (HTML, CSS)

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable Prerequisites:
- Basic knowledge in HTML tags & skill of creating web pages should be known
- Knowledge of basic Computer hardware & software is also necessary.

Course Objectives:
- Define the basics in web design
- Visualize the basic concept of HTML
- Introduce concept of CSS

Course Outcomes:

On completion of the course, student will be able to–
- Implement interactive web page(s) using HTML, CSS
- Design a responsive web site using HTML5 and above, CSS3 and above

Course Contents

Chapter 1	Introduction to Computer System	6
	1.1 Introduction, Characteristics of Computers, Block diagram of computer 1.2 Types of computers and features- Mini Computers, Micro Computers, Mainframe Computers, Super Computers, Laptops and Tablets 1.3 Primary and Secondary storage devices 1.4 Primary storage devices – RAM, ROM, PROM, EPROM 1.5 Secondary Storage Devices - CD, HD, Pen drive 1.6 I/O Devices- Scanners, Digitizers, Plotters, LCD, Plasma Display, 1.7 Pointing Devices –Mouse, Joystick, Touch Screen	

Chapter 2	Introduction to Web Technologies	5
	2.1 Brief History of Internet	
	2.2 Introduction to Web Technologies	
	2.3 Creation of a web site	
	2.4 Working of Website	
	2.5 Introduction of Clients- Servers and Communication	
	2.6 Client and Server Scripting Languages	
	2.7 Internet-Basic, Internet Protocols (HTTP,FTP,IP)	
	2.8 World Wide Web (WWW)	
	2.9 HTTP Request message, HTTP Response message	
	2.10 Types of Websites (Static and Dynamic Websites)	
Chapter 3	Basics in Web Design	12
	3.1 Five Golden rules of Web Designing	
	3.2 Designing Navigation Bar	
	3.3 Page Design	
	3.4 Home Page Layout	
	3.5 Design Concept	
	3.6 Web Standards	
	3.7 Audience Requirement	
Chapter 4	Introduction to HTML	10
	4.1 Basic HTML Document	
	4.2 HTML Tags	
	4.3 HTML Document Structure	
	4.4 HTML Basic Tags	
	4.5 HTML – FORMATTING Tags	
	4.6 HTML – IMAGES	
	4.7 HTML – LISTS	
Chapter 5	HTML – Tables	6
	5.1 Table Tags	
	5.2 Cellpadding and Cellspacing Attributes	
	5.3 Colspan and Rowspan Attributes	
	5.4 Tables Backgrounds	
	5.5 Table Height and Width	
	5.6 Table Caption	
	5.7 Table Header, Body, and Footer	
	5.8 Nested Tables	
Chapter 6	Advanced HTML tags	10
	6.1 Embedding Audio and Video	
	6.2 Working with Text	
	6.3 Working with Frames	
	6.4 Working with Multimedia	
	6.5 Working with Forms and Controls	
Chapter 7	Introduction to Cascading Style Sheets	10

| | 7.1 Concept of CSS
7.2 Creating Style Sheet
7.3 CSS Properties
7.4 CSS Styling (Background, Text Format, Controlling Fonts)
7.5 Working with Block Elements and Objects
7.6 Working with Lists and Tables
7.7 CSS Id and Class
7.8 Box Model (Introduction, Border Properties, Padding Properties, Margin Properties)
7.9 CSS Advanced (Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector)
7.10 CSS Color
7.11 Creating page Layout and Site Designs | |
| | **EXPERIENTIAL LEARNING** | 1 |

Reference Books:

1. Computer Fundamentals by P K Sinha, sixth edition, BPB publication, ISBN: 9788176567527

2. Complete HTML- Thomas Powell, fifth edition, McGrawHill publication,

   ISBN:9780070701946

3. HTML and JavaScript–Ivan Bayross, fourth edition, BPB publication, ISBN:978818330084

Reference Links:

https://www.tutorialspoint.com/

1. https://www.w3schools.com/

Course Code: 19ScBCAU105
Lab I: Programming in 'C' and Problem Solving Methods

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

List of Assignments:

1. Assignment to demonstrate use of data types, simple operators (expressions)

2. Assignment to demonstrate decision making statements (if and if-else, nested structures)

3. Assignment to demonstrate decision making statements (switch case)

4. Assignment to demonstrate use of simple loops

5. Assignment to demonstrate use of nested loops

6. Assignment to demonstrate menu driven programs.

7. Assignment to demonstrate writing C programs in modular way (use of user defined functions)

8. Assignment to demonstrate recursive functions.

9. Assignment to demonstrate use of arrays (1-d arrays) and functions

10. Assignment to demonstrate use of multidimensional array(2-d arrays) and functions

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Course Code: 19ScBCAU106
Lab II: Fundamentals of Web Technologies (HTML, CSS)

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

 Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

List of Assignments:

1. Creating Simple HTML Pages

2. HTML programming using lists

3. HTML programming using tables

4. Working with Tables and hyperlinks

5. HTML programming using frames

6. HTML programming using iframes

7. Feature of HTML (CSS and its Types-I)

8. Features of HTML5(CSS and its Types-II)

9. Creation of Forms layout designing by using div element with CSS property

10. Embedding Audio and Video

11. Working with Multimedia

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU107
Lab III: Advanced Spreadsheet Concepts

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

List of Assignments:

1. Demonstrate Excel lists
2. Usage of Conditional Expressions
3. Usage of Logical Functions
4. Using Lookup and Reference Functions
5. Usage of Macros
6. Working with Tables
7. Working with Bar and Line Chart
8. 2D Graphs
9. Creating Pivot tables
10. Working with Pivot Charts

Desirable Prerequisite:
- The student is expected to have a good prior understanding of the basic features available in Microsoft Excel/spreadsheet

Course Objectives:
- To learn to use Advance Excel/Spreadsheet(like MS Excel) in various assessment functions

Course Outcomes:

On completion of the course, the student will be able to create lookup functions, Excel sheet working options, enhance charts, protect worksheet data, and perform advanced data operations using summarizing, PivotTables, data consolidations, goal seeking, and Solver

Contents of Lab course

Chapter No.	Title	Hours
Chapter 1	**Introduction to Excel**	5
	1.1 Fundamentals MS Excel 1.2 Basic Text and Cell Formatting	

	1.3 Using Excel Lists 1.4 Basic Arithmetic Calculation Special Paste 1.5 Auto completion of Series 1.6 Sort and Filter 1.7 Charts	
Chapter 2	**Working with function**	**5**

	2.1 Writing conditional expressions (using IF)
	2.2 Using logical functions (AND, OR, NOT)
	2.3 Using lookup and reference functions
	  (VLOOKUP, HLOOKUP, MATCH, INDEX)
	2.4 VlookUP with Exact Match, Approximate
	  Match
	2.5 Nested VlookUP with Exact Match
	  VlookUP with Tables, Dynamic Ranges
	2.6 Macros	

Chapter 3	**Data validations, What if Analysis**	**5**

	3.1 Specifying a valid range of values for a
	     cell
	3.2 Specifying a list of valid values for a
	     cell
	3.3 Specifying custom validations based on
	     formula for a cell
	3.4 Goal Seek
	3.5 Data Tables
	3.6 Scenario Manager	

Chapter 4	**Sorting and filtering data**	**5**
	4.1 Sorting tables 4.2 Using multiple-level sorting 4.3 Using custom sorting 4.4 Filtering data for selected view (AutoFilter) 4.5 Using advanced filter options	
Chapter 5	**Charts**	**5**

	5.1 Using Charts
	5.2 Formatting Charts
	5.3 Using 3D Graphs
	5.4 Using Bar and Line Chart together
	5.5 Using Secondary Axis in Graphs
	     Sharing Charts with PowerPoint / MS
	     Word, Dynamically (Data Modified in
	     MS Excel, Chart would automatically get
	     updated)	

Chapter 6	**Working With Reports**	**5**
	6.1 Creating subtotals 6.2 Multiple-level subtotals 6.3 Creating Pivot tables 6.4 Formatting and customizing Pivot	

	tables	
	6.5 Using advanced options of Pivot tables	
	6.6 Pivot charts	
	6.7 Consolidating data from multiple sheets and files using Pivot tables	
	6.8 Using external data sources	
	6.9 Using data consolidation feature to consolidate data	
	6.10 Viewing Subtotal under Pivot	

Reference Books:

1. Microsoft Excel 2016 Data Analysis and Business Modelling by Wayne L Winston ISBN 978-1509304233
2. Advance Excel 2016 in Depth by Jelen Bill ISBN 978-0789755841

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU201

Course Name: Discrete Mathematics-II

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable Prerequisite:
- Basic knowledge of mathematical concepts is desirable

Course Objectives:
- Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contra positives using truth tables and the properties of logic
- Determine the domain and range of a discrete or non-discrete function
- Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.

Course Outcomes:

On completion of the course, the student will be able to–
- Enhances his/her ability to reason and ability to present a coherent and mathematically accurate argument.
- Apply basic counting techniques to solve combinatorial problems

Course Contents

Chapter No.	Title	Lectures
Chapter 1	**Modular Arithmetic**	**15**
	1.1 Relations	
	1.2 Congruences	
	1.3 Applications of Modular Arithmetic	
	1.4 Fermat's Little Theorem	
	1.5 Congruence and Groups	
Chapter 2	**Two Principles of counting**	**6**
	2.1 The Pigeonhole Principle	
	2.2 The Inclusion-Exclusion Principle	
Chapter 3	**Recurrence Relations**	**10**
	3.1 General Properties	

	3.2 First-Order Recurrences	
	3.3 Second-Order Recurrences	
	3.4 General Linear Recurrences	
Chapter 4	**Graphs**	**14**
	4.1 Definition and examples	
	4.2 Incidence and Degree	
	4.3 Handshaking Lemma	
	4.4 Isomorphism	
	4.5 Subgraphs,Walk,Path,Circuits,ConnectedGraphs	
	4.6 Euler graph, Operations on graph	
	4.7 Hamiltonian graph	
	4.8 Directed graphs, Planar graph, Colouring	
Chapter 5	**Trees**	**14**
	5.1 Definition and properties of tree	
	5.2 Pendent vertices, Centre of tree, Spanning trees	
	5.3 Fundamental circuits, Cut set, Cut vertices	
	EXPERIENTIAL LEARNING	1

Reference books:

1. Discrete Mathematics and Application by Kenneth Rosen, **ISBN-13:** 978-0072899054
2. Elements of Discrete Mathematics by C.L. Liu, **ISBN-13:** 978-0071005449
3. Concrete Mathematics by Graham, Knuth and Patashnik, **ISBN-13:** 978-0201558029

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU202
Course Name: Advanced 'C' Programming

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable Prerequisite:
- Knowledge of basic 'C' Programming

Course Objectives:
- To Study broad overview of problem solving techniques
- To learn the use of Advanced 'C' programming to solve these problems

Course Outcomes:

On completion of the course, the student will be able to–
- Develop small applications with the use of features such as String, Pointers, Structures and Union, Files and preprocessor directives in C Language

Course Contents

Chapter No.	Title	Number of Lectures
Chapter 1	**Strings**	**12**
	1.1 Concept of a String 1.2 Declaration, definition, initialization, format specifiers 1.3 String literals/ constants & variables – reading & writing from & to console 1.4 Importance of terminating NULL character 1.5 Strings & pointers 1.6 Array of strings & array of character pointers 1.7 User defined functions for predefined functions in string.h 1.8 Command line arguments 1.9 Programs using built-in functions and without built-in functions	
Chapter 2	**Pointers**	**12**
	2.1 Concept – reference & dereference (Data model – Value model v/s Reference model)	

	2.2 Declaration, definition, initialization & use
	2.3 Types of pointers
	2.4 Pointer Arithmetic
	2.5 Relationship between Arrays & Pointers
	   2.5.1 Pointer to array
	2.5.2 Array of pointers
	2.6 Multiple Indirection (introduction of double pointer)
	2.7 Functions & pointers
	   2.7.1 Passing pointer to function
	  2.7.2 Returning pointer from function
	   2.7.3Function pointer
	2.8 Pointers & Constants
	2.9 Dynamic memory management
	2.9.1 Allocation
	   2.9.2 Resizing
	2.9.3 Releasing
	   2.9.4 Memory leak / dangling pointers	

Chapter 3	**Structures and Union**	**20**

	3.1 Concept of structure
	  3.2 Declaration, definition, initialization,
	  accessing structure members (. operator)
	3.3 Array of structures
	3.4 Pointers to structures
	  3.4.1 Declaring pointer to structure
	  3.4.2 Accessing structure members via pointer to structure (_ operator)
	  3.4.3 Structures & functions
	  3.4.4 Passing each member of structure as a separate argument
	  3.4.5 Passing structure by value / address
	  3.4.6 Nested structures
	  3.4.7 typedef& structures
	  3.4.8 typedef versus #define
	  3.4.9 Bit fields
	  3.5 Concept of Union
	  3.5.1 Declaration, definition, accessing union members
	  3.5.2 Examples
	  3.5.3 Difference between Structures & unions	

Chapter 4	**File Handling**	**10**

	4.1 Concept of streams, need of files 4.2 Types of files 4.3 Operations on text & binary files 4.4 Random access to files 4.5 File handling Examples	
Chapter 5	**Preprocessor**	**05**
	5.1 Concept 5.2 Format of preprocessor directives 5.3 File inclusion directives (#include) 5.4 Macro substitution directives (#define), nested macros, parameterized macros 5.5 Macros versus functions • #error / #pragma directives • Conditional compilation • (#if/#ifdef/#else/#elif/#endif) • Predefined macros (_DATE_ / _TIME_ • /_FILE_ /_LINE_ / _STDC_) 5.6 Preprocessor operators 5.6.1 Macro continuation (\\) 5.6.2 stringsize (#) 5.6.3 token pasting (##) 5.6.4 defined()	
	EXPERIENTIAL LEARNING	1

Reference Books:

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
2. How to Solve it by Computer, R.G. Dromey, ISBN: 9788131705629, PearsonEducation
3. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg ISBN:9788131500941, Cengage Learning India
4. Programming in ANSI C, E. Balaguruswamy, ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi

Progressive Education Society's

Modern College of Arts, Science and Commerce (Autonomous)

Shivajinagar, Pune - 5

First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU203
Course Name: Computer Organization

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Desirable Prerequisite:
Basic Understanding of Computer System

Course Objectives:
- To understand basic components of computers
- To understand the architecture of 8086 processor
- To understand the instruction sets, instruction formats and various addressing modes of 8086
- To understand the representation of data at the machine level and how computations are performed at machine level
- To understand the memory organization and I/O organization
- To understand the parallelism both in terms of single and multiple processors

Course Outcomes:
On completion of the course, student will be able to–
- Design
- Understand the basic components and the design of CPU, ALU and Control Unit
- Understand memory hierarchy and its impact on computer cost/performance.
- Understand the advantage of instruction level parallelism and pipelining for high performance Processor design
- Apply linguistic theory
- Understand the instruction set, instruction formats and addressing modes of 8086
- Write assembly language programs to solve problems

Course Contents

Chapter No.	Title	Number of Lectures
Chapter 1	**Data representation and Computer Arithmetic**	**6**
	1.1 Number System and their inter conversion	
	1.2 BCD codes	
	1.3 Weighted and unweighted codes	

	1.4 Character codes 1.5 Concept of parity code 1.6 Signed number representation 1.7 Binary arithmetic	
Chapter 2	**Digital circuits**	**20**
	2.1 Gates 2.2 De-Morgan's theorem and Concept of K-map 2.3 Combinational circuits 2.4 Sequential circuits 2.5 Concept of counters and types 2.6 Concept of registers and type	
Chapter 3	**CPU organization**	**6**

	3.1 Block diagram of CPU
	3.2 Functions of CPU
	3.3 General register organization
	3.4 Stack organization (operation of
	    stack, types of stack, register stack and
	    memory stack), Block diagram of ALU	

Chapter 4	**Memory Organization**	**7**
	4.1 Memory Hierarchy 4.2 Internal and External memory 4.3 Use of Cache memory(Address mapping with cache) 4.4 Associative memory 4.5 Virtual memory(concept)	
Chapter 5	**Input output organization**	**8**

	5.1 Introduction
	5.2 Peripheral devices
	5.3 I/O Interface
	5.4 Serial communication
	  (Asynchronous and Synchronous
	  data transfer)
	5.5 Concept of interrupts, IVT and size
	of IVT
	5.6 Types of I/O transfer (CPU
	 initiated, interrupt initiated and DMA)
	5.7 DMA controller	

Chapter 6	**Architecture of Microprocessor**	**5**

	6.1 Block diagram of 8086
	6.2 8086 registers
	6.3 Numerical coprocessor concept and
	    6.3.1 Block diagram and functional
	    diagram of numerical co-processor	

Chapter 7	**Parallel Processing**	**7**
	7.1 Concept of parallelism 7.2 Parallel computer structures 7.3 Concept of pipeline	

	7.4 Instruction pipeline	
	7.5 Arithmetic pipeline	
	7.6 Concept of RISC and CISC	
	EXPERIENTIAL LEARNING	1

Text Books:

1. Computer System Architecture, M. Moris Mano, Third Edition, Pearson. ISBN:9780131755635

2. Advanced Microprocessors and Peripherals, K M Bhurchandi, A.K Ray ,3rd edition, McGraw Hill India Education Private Ltd. ISBN:9781259006135

Reference Books:

1. Microprocessors and Interfacing, D V Hall, SSSP Rao, 3rd edition, McGraw Hill India Education Private Ltd. ISBN:9781259006159

2. Carl Hamacher, ZvonkoVranesic, SafwatZaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002, ISBN: 9781259005275

3. Computer Organization and Architecture, William Stallings, 9th Edition, Pearson ISBN: 9780132936330.

4. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009, ISBN: 9780080886138.

List of Open Source Software/ Website:

- NPTEL Lecture Series
- http://www.intel.com/pressroom/kits/quickreffam.htm
- web.stanford.edu/class/ee282/

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU204
Course Name:Database ManagementSystem-I(PostgreSQL)

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

Prerequisite Courses: Basic Computer awareness

Course Objectives:

1. To learn and practice data modelling using the entity-relationship and developing database designs.
2. To understand the use of Structured Query Language (SQL) and SQL syntax
3. To apply normalization techniques to normalize the database

Course Outcomes:

The student will be able to:

1. Describe data models and schemas in DBMS
2. Understand the features of Database Management Systems and Relational Database
3. Use SQL- the standard language of relational databases.

Course Contents

Chapter No.	Title	Number of Lectures
Chapter 1	**Introduction to Database Concepts**	**10**
	1.1 Data 1.2 Information 1.3 Database 1.4 DBMS 1.5 Data Dictionary 1.6 File system Vs. DBMS 1.7 Advantages & Disadvantages of DBMS 1.8 View of Data 1.9 Database Languages 1.10 Data Models 1.11 Levels of Abstraction 1.12 Data Independence 1.13 Database Architecture	
Chapter 2	**Conceptual Design (E-R model)**	**10**

	2.1 Overview of DB design 2.2 ER data model (Entities, Attributes, Entity sets, Relations, Relationship sets) 2.3 Entity Relationship Diagrams 2.4 Extended ER features 2.5 Case Studies	
Chapter 3	**Structure of Relational Databases**	**05**

	3.1 Concept of a tuple, Column, Table,
	  Relation and a key in a Relational
	  Database.
	3.2 Conversion of ER to Relational Model.
	3.3 Concept of Primary Key, Super key,
	  Foreign Key and Candidate Key	

Chapter 4	**SQL**	**20**

	4.1 Introduction
	    4.2 DDL Commands with examples
	    4.3 DML Commands with examples
	    4.4 Basic structure of SQL queries
	4.5 Integrity Constraints(primary key,
	referential integrity, null constraint, unique
	constraint, check constraint)
	4.6 Set operations
	    4.7 Aggregate functions
	4.8 Null Values
	4.9 Nested Sub-queries
	4.10 SQL mechanisms for joining relations
	(inner join, outer join and their types)	

Chapter 5	**Relational Database Design**	**14**

	5.1 Pitfalls in relational database design
	5.2 Functional Dependencies (Basic
	    Concepts, Closure of set of
	    functionaldependencies, Closure of an
	    Attribute set)
	5.3 Decomposition
	5.4 Desirable properties of
	    Decomposition
	5.5 Concept of Normalization
	5.6 Normal forms (only definitions) 1NF,
	    2NF, 3NF and BCNF
	5.7 Examples on Normalization	

	EXPERIENTIAL LEARNING	1

Reference Books:
1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S. Sudarshan,Tata McGraw-Hill Education
2. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke,

McGraw-Hill Science/Engineering/Math;

3. Edition 3. Database Systems, Shamkant B. Navathe, RamezElmasri,Pearson Higher Education

4. Tutorial:https://www.tutorialspoint.com/postgresql/

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU205
Lab I: Advanced C Programming

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

List of Assignments:

1. Assignment to demonstrate use of Pointers
2. Assignment to demonstrate concept of strings (string & pointers)
3. Assignment to demonstrate array of strings
4. Assignment to demonstrate use of bitwise operators (Memory management)
5. Assignment to demonstrate structures (using array and functions)
6. Assignment to demonstrate structures and unions
7. Assignment to demonstrate command line arguments and preprocessor directives.
8. Assignment to demonstrate file handling (text files)
9. Assignment to demonstrate file handling (binary files and random access to files)
10. Assignment to demonstrate Pre-processor directives

Course Code: 19ScBCAU206
Lab II:Database Management System-I PostgreSQL)

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

List of Assignments:
1. Demo of PostgreSQL and ER Diagram
2. Data Definition queries (Create)
3. Data Definition queries (Alter)
4. Data Definition queries (Drop)
5. Simple queries (Select)
6. Queries with Join
7. Aggregate queries (Group by and having)
8. Nested queries
9. Data Manipulation queries (Insert)
10. Data Manipulation queries (Update)
11. Data Manipulation queries (Delete)
12. Demo of PgAdmin and table creation

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First Year of B.C.A. (Science) (2019 Course)

Course Code: 19ScBCAU207
Lab III: Discrete Mathematics Tutorial

Teaching Scheme: TH: 4 Lectures/ Week   **Credit: 04**

 Examination Scheme: CIA: 40 Marks   **End-Sem: 60 Marks**

List of Assignments:

1. Problems on relations
2. Problems on congruences
3. Problems on pigeonhole principle
4. Problems using inclusion exclusion principle
5. Problems on first order recurrence
6. Problems on second order recurrence
7. General recurrence relation-based problems
8. Problems on concept of indegree and outdegree of graph
9. Problems on Handshaking lemma
10. Questions on isomorphism of graph
11. Problems on isomorphism of graph
12. Questions on trees