

MAHENDRA ARTS & SCIENCE COLLEGE

(AUTONOMOUS)

Affiliated to Periyar University, Salem

[Accredited by NAAC "A" Grade & Recognized under u/s 2(f) and 12(B) of the UGC act 1956]

KALIPPATTI - 637501



BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS FOR BCA

OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM

**FOR THE STUDENTS ADMITTED FROM
THE ACADEMIC YEAR 2019 – 2020 ONWARDS**

MAHENDRA ARTS & SCIENCE COLLEGE (Autonomous)

(Affiliated to Periyar University)

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

BCA

PREAMBLE

BCA is a systematically designed three year course that prepares the student for a career in software industry. The syllabus of BCA subject along with that of two allied subjects (Mathematics & Accountancy) forms the required basics for pursuing higher studies in BCA. The syllabus also develops requisite professional skills and problem solving ability for pursuing a career in software industry.

I - PROGRAMME EDUCATIONAL OBJECTIVES

- Graduates will have successful careers in computer fields or will be able to successfully pursue higher studies.
- Graduates will apply their technical knowledge and skills to develop and implement solutions for the problems that accomplish goals to the Industry, Academic, Government or Research area.
- Contribute effectively to the computing profession by fostering effective interaction, ethical practices and communication skills, while pursuing education through lifelong learning.

II - PROGRAMME OUTCOMES

- Provides a solid foundation in the discipline of Computer Applications and enable students to formulate computational solutions to real life problems.
- To possess knowledge to identify, analyze, design for an optimized solution using appropriate algorithms of varying complexity using cutting edge technologies.
- To develop skills in software and hardware maintenance so as to enable the students to establish a productive career in industry, research and academia.
- Equip the students to meet the industrial needs by utilizing tools and technologies with the skills to communicate effectively among peers.
- Foundation graduate programme which induces continuous improvement of knowledge and act as a platform for higher studies and engage in research.

III - REGULATIONS

These regulations shall take effect from the academic year 2019-2020, i.e., for students who are to be admitted to the first year of the course during the academic year 2019-20 and thereafter.

1. Objectives of the Course

Computer Applications to-day is penetrating all fields of human endeavor and therefore it is necessary to prepare the students to cope with the advanced developments in various fields of computer applications. The objectives of this course are the following:

(a) To import knowledge in advanced concepts and applications in various fields of computer science.

(b) To provide wide choice of elective subjects with updated and new areas in various branches of computer applications to meet the needs of all students.

2. Eligibility for Admission

A candidate who has passed in Higher Secondary Examination with Mathematics or Business Mathematics or Computer science or Statistics (Academic Stream or Vocational Stream) as one of the subject under Higher Secondary Board of Examination, Tamil Nadu as per the norms set by the Government of Tamil Nadu or an Examination Accepted as equivalent there to .

3. Duration of the Course

The course of study of Bachelor of Computer Applications shall consist of three academic years divided into six semesters with 143 credits. Each Semester consists of 90 working days.

4. Course of Study

The course of study for the UG degree has been divided into the following five categories:

Part I : Tamil / Other Languages.

Part II : English Language.

Part III : Core Courses, Elective Courses and Allied Courses.

Part IV : Skill Enhancement Courses, Non-Major Elective Courses,
Enhancement Compulsory Courses.

Part V : Extension Activity

5. Examinations

The Theory/ Practical examinations shall be of three hours duration for each paper at the end of each semester. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examinations.

6 . Structure of the Programme

SEMESTER: I

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil-I / Hindi-I / French-I	M19UFTA01	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – I	M19UFEN01	5	-	3	25	75	100
III	CORE COURSE-I	Computer Organization And Architecture	M19UCA01	5	-	4	25	75	100
	CORE COURSE-II	Programming in C	M19UCA02	5	-	4	25	75	100
	CORE PRACTICAL –I	Practical – I - Programming in C	M19UCAP01	-	3	2	40	60	100
	ALLIED COURSE-I	Allied Mathematics-I: Algebra, Integral Calculus and Fourier Series	M19UMAA01	5	-	4	25	75	100
IV	ENHANCEMENT COMPULSORY COURSE - I	Value Education - Yoga	M19UVE01	2	-	2	25	75	100
Total				27	3	22	190	510	700

SEMESTER: II

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil-II / Hindi-II / French-II	M19UFTA02	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – II	M19UFEN02	5	-	3	25	75	100
III	CORE COURSE-III	Data Structures	M19UCA03	5	-	4	25	75	100
	CORE COURSE-IV	Object Oriented programming with C++	M19UCA04	5	-	4	25	75	100
	CORE PRACTICAL -II	Practical - II - Data Structures using C++	M19UCAP02	-	3	2	40	60	100
	ALLIED COURSE-II	Allied Mathematics –II: Differential Equations and Laplace Transforms	M19UMAA02	5	-	4	25	75	100
IV	ENHANCEMENT COMPULSORY COURSE - II	Environmental Studies	M19UES01	2	-	2	25	75	100
Total				27	3	22	190	510	700

SEMESTER: III

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE-V	Relational Database Management Systems	M19UCA05	5	-	4	25	75	100
	CORE COURSE-VI	Operating Systems	M19UCA06	5	-	4	25	75	100
	CORE COURSE-VII	Computer Graphics	M19UCA07	5	-	4	25	75	100
	CORE COURSE PRACTICAL - III	Practical - III - Oracle	M19UCAP03	-	3	2	40	60	100
	ALLIED COURSE-III	Allied-III - Principles of Accountancy	M19UCMA01	5	-	4	25	75	100
	ALLIED PRACTICAL - I	Allied Practical - I - Tally	M19UCMAP01	-	3	2	40	60	100
IV	NMEC - I			2	-	2	25	75	100
	SEC-I	SEC-I - MS-Office	M19UCAS01	2	-	2	25	75	100
Total				24	6	24	230	570	800

SEMESTER: IV

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE-VIII	Programming in Java	M19UCA08	5	-	4	25	75	100
	CORE COURSE-IX	Client / Server Technology	M19UCA09	5	-	4	25	75	100
	CORE COURSE-X	Software Engineering	M19UCA10	5	-	4	25	75	100
	CORE PRACTICAL - IV	Practical - IV Programming in Java	M19UCAP04	-	3	2	40	60	100
	ALLIED COURSE-IV	Allied - IV: Modern Banking	M19UCMA02	5	-	4	25	75	100
	ALLIED PRACTICAL -II	Allied Practical - II - Commerce Practical	M19UCMAP02	-	3	2	40	60	100
IV	NMEC-II			2	-	2	25	75	100
	SEC-II	SEC - II - Shell Programming	M19UCAS02	2	-	2	25	75	100
V	EXTENSION ACTIVITIES	Extension Activities	M19UEX01	-	-	1	-	-	-
Total				24	6	25	230	570	800

SEMESTER: V

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE-XI	Web Technology	M19UCA11	6	-	5	25	75	100
	CORE COURSE-XII	.Net Programming	M19UCA12	6	-	5	25	75	100
	CORE COURSE-XIII	Data Communication and Networking	M19UCA13	6	-	4	25	75	100
	ELECTIVE COURSE	Elective – I		4	-	4	25	75	100
	CORE PRACTICAL – V	Practical – V - Web Technology	M19UCAP05	-	3	2	40	60	100
	CORE PRACTICAL – VI	Practical – VI .Net Programming	M19UCAP06	-	3	2	40	60	100
IV	SEC-III	SEC – III – Open Source Technology	M19UCAS03	2	-	2	25	75	100
III	Project Work		Exam at VI Semester						
Total				24	6	24	205	495	700

SEMESTER: VI

Part	Course Category	Title of the Course	Course Code	Hrs / Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
III	CORE COURSE-XIV	Python Programming	M19UCA14	6	-	5	25	75	100
	CORE COURSE-XV	Data Mining	M19UCA15	6	-	5	25	75	100
	CORE COURSE-XVI	Mobile Computing	M19UCA16	6	-	4	25	75	100
	ELECTIVE COURSE	Elective – II		4	-	4	25	75	100
	CORE PRACTICAL - VII	Practical – VII - Python Programming	M19UCAP07	-	3	2	40	60	100
	CORE PRACTICAL - VIII	Practical – VIII - Data mining using Rapid miner	M19UCAP08	-	3	2	40	60	100
	CORE PROJECT	Project	M19UCAPR1	-	-	2	40	60	100
IV	SEC-IV	SEC – IV – Perl Programming	M19UCAS04	2	-	2	25	75	100
	Additional Credit Given for SWAYAM / MOOC			-	-	1	-	-	-
Total				24	6	26	245	555	800
TOTAL				152	28	143	1290	3210	4500

Summary of Credits, Hours and Mark Distribution

Part	Course Name	No. of Credits						Total Credits	Total Hours	No. of Courses	Max. Marks
		I	II	III	IV	V	VI				
I	Language – I	3	3	-	-	-	-	06	10	02	200
II	Language – II	3	3	-	-	-	-	06	10	02	200
III	Major	8	8	12	12	14	14	68	86	16	1600
	Major Practical	2	2	2	2	4	4	16	24	08	800
	Elective	-	-	-	-	4	4	08	08	02	200
	Project Work	-	-	-	-	-	2	02	-	01	100
	Allied	4	4	4	4	-	-	16	20	04	400
	Allied Practical	-	-	2	2	-	-	04	06	02	200
IV	NMEC	-	-	2	2	-	-	04	04	02	200
	SEC	-	-	2	2	2	2	08	08	04	400
	Enhancement Compulsory Courses	2	2	-	-	-	-	04	04	02	200
V	Extension Activities	-	-	-	1	-	-	01	-	01	-
Total		22	22	24	25	24	26	143	180	46	4500

ALLIED SUBJECTS FOR BCA STUDENTS

SEM	PAPER NAME	PAPER CODE
I	ALLIED MATHEMATICS – I – ALGEBRA, INTEGRAL CALCULUS AND FOURIER SERIES	M19UMAA01
II	ALLIED MATHEMATICS – II – DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	M19UMAA02
III	ALLIED – III – PRINCIPLES OF ACCOUNTANCY	M19UCMA01
	ALLIED PRACTICAL – I – TALLY	M19UCMAP01
IV	ALLIED – IV – MODERN BANKING	M19UCMA02
	ALLIED PRACTICAL – II – COMMERCE PRACTICAL	M19UCMAP02

ELECTIVE SUBJECTS FOR BCA STUDENTS

SEMESTER	ELECTIVE - I		
V	S.No	Course Title	Course Code
	1.	Compiler Design	M19UCAE01
	2.	Soft Computing	M19UCAE02
	3.	Software Testing	M19UCAE03
	4.	Ruby on Rails	M19UCAE04
ELECTIVE - II			
VI	S.No	Course Title	Course Code
	1.	Cyber Security	M19UCAE05
	2.	Cloud Computing	M19UCAE06
	3.	Big Data Analytics	M19UCAE07
	4.	Distributed Computing	M19UCAE08

SKILL ENHANCEMENT COURSES

Semester	Course Title	Course Code
III	SEC-I – MS-Office	M19UCAS01
IV	SEC-II – Shell Programming	M19UCAS02
V	SEC –III – Open Source Technology	M19UCAS03
VI	SEC –IV – Perl Programming	M19UCAS04

IV. SCHEME OF EXAMINATIONS

1. Question Paper Pattern for Theory Papers

Time: Three Hours

Maximum Marks: 75

Part A: (10 x 1 = 10)

Answer ALL Questions

(Objective Type - Two Questions from each unit)

Part B: (5 x 2 = 10)

Answer ALL Questions

(One Question from each unit)

Part C: (5 x 5 = 25)

Answer ALL Questions

(One Question from each unit with internal choice)

Part D: (3 x 10 = 30)

Answer Any Three out of Five Questions

(One Question from each unit)

2. Question Paper Pattern for Practical Papers

Time: Three Hours

Maximum Marks: 60

Two Major Questions from the List of Practical's each carry 30 Marks

1. Part A - a) From the list of practical's 1, 2 and 3 (or) b) From the list of practical's 4 and 5.

(AND)

2. Part B - a) From the list of practical's 6, 7 and 8 (or) b) From the list of practical's 9 and 10.

3. Distribution of Marks

The following are the distribution of marks for external and internal for End Semester Examinations and continuous internal assessment and passing minimum marks for Theory/Practical/Project papers of UG programmes.

ESE	EA Total	Passing Minimum for EA	CIA Total	Passing Minimum for CIA	Total Marks Allotted	Passing Minimum (ESE)
Theory	75	30	25	10	100	40
Practical	60	24	40	16	100	40
Project	60	24	40	16	100	40

The following are the Distribution of marks for the Continuous Internal Assessment in Theory / Practical papers of UG programmes.

THEORY

EVALUATION OF INTERNAL ASSESSMENT

Test	: 15 Marks
Assignment	: 05 Marks
Attendance	: 05 Marks

Total	: 25 Marks

The Passing minimum shall be 40% (10 Marks) out of 25 marks

PRACTICAL

EVALUATION OF INTERNAL ASSESSMENT

Internal Exam	: 25 Marks
Record	: 15 Marks

Total	: 40 Marks

The Passing minimum shall be 40% (16 marks) out of 40 marks

EVALUATION OF EXTERNAL ASSESSMENT

- Algorithm / Flow chart - 20%
- Writing the program in the main answer book - 30%
- Test and debug the programs - 30%
- Printing the correct output - 20%

The Passing minimum shall be 40% (24 marks) out of 60 marks

(Marks may be proportionately reduced for the errors committed in each of the above mentioned distributions)

PROJECT

EVALUATION OF INTERNAL ASSESSMENT

Review 1	:	10 Marks
Review 2	:	10 Marks
Review 3	:	10 Marks
Pre-Viva	:	10 Marks

Total	:	40 Marks

The Passing minimum shall be 40% (16 marks) out of 40 marks

4. Passing Minimum

The Candidates shall be declared to have passed the examinations if he/she secures not less than 40 marks in total (CIA mark + Theory Exam mark) with minimum of 10 Marks in the CIA and 30 marks in the End Semester Theory Examinations.

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 16 Marks in the CIA and 24 marks in the End Semester Practical Examinations.

Failed Candidates in the internal assessment are permitted to improve their internal assessment marks in the subsequent semesters (2 Chances will be given) by written test and by assignment submission.

5. Submission of Record Note Books for Practical Examinations

Candidates appearing for practical examinations should submit a record note books prescribed for practical examinations. The candidates failed to submit the record book shall not be permitted to appear for the practical examinations

6. Project

The following guidelines to be followed for the project with Viva-voce:

1. The project report should be evaluated for 60 marks by an external examiner; however the Viva-Voce examination should be conducted by both the external examiner appointed by the college and the internal examiner / guide concerned.
2. The project report may consist of a minimum 60 pages.
3. The candidate has to submit the project report before 20 days of the commencement of VI Semester Examinations.
4. A candidate who fails in the Project or is absent may resubmit the report, on the same topic, with concern of internal guide with necessary modifications / corrections / improvements in the subsequent Even Semester Examinations for evaluation and shall undergo viva-voce Examinations.

7. Note

a) SWAYAM / MOOC – Free Online Education

SWAYAM / MOOC are an instrument for self-actualization providing opportunities for a life-long learning. Here the student can choose from hundreds of courses, virtually every course taught at the college level, offered by the best teachers in India and elsewhere.

The students can choose an online SWAYAM / MOOC course during their period of study which will earn an extra credit and it will be transferred to the academic records of the students.

b) Add-on courses

Students are provided with additional courses during their course of study right from the First year. Students are free to choose the courses. On successful completion of each course, the students will gain one extra credit.

SEMESTER – I

Core Course - I	BCA	2019 - 2020
M19UCA01	COMPUTER ORGANIZATION AND ARCHITECTURE	
Credit: 4		

Objectives

This course introduces the basic fundamental principles of digital computers, Logic Gates, Arithmetic circuits, Data processing circuits and Architecture principles.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember about the Number systems	K1
CO2	Remember the concept of Logic Gates	K1
CO3	Understand the basics of simple arithmetic circuits	K2
CO4	Analyze about the Flip flops and Convertors	K4
CO5	Apply the concepts of Computer Architecture	K3

UNIT I

Number Systems and Codes: Number systems - Decimal, Binary, Octal, Hexadecimal - conversion from one to another - ASCII code, Excess-3 code, gray code - binary addition, subtraction, multiplication and division – complements in number systems.

UNIT II

Logic Gates: AND, OR, NOT, NOR & NAND gates, EX-OR gates. Boolean algebra and Boolean laws and theorems: De Morgan's theorems – Boolean Laws and Theorems - Sum-of-Products Method - Truth Table to Karnaugh Map - Pairs, Quads, and Octets - Karnaugh Simplifications - Don't-care Conditions - Product-of-sums Method - Product-of-sums Simplification.

UNIT III

Simple Arithmetic Circuits: Half adder- Full adder – Half subtractor – Full subtractor - BCD adder – BCD subtractor. **Data processing circuits:** Multiplexers – De-multiplexers - Encoders and Decoders.

UNIT IV

Sequential Logic Design: Flip-flops - RS, JK, D & T Flip flops - Master / Slave Flip flop - Shift Registers - Counters - Asynchronous and Synchronous Counters - Digital to Analog Converters - Analog to Digital converters.

UNIT V

Input / Output organization: Input / Output interface – Asynchronous data transfer – Mode of transfer - Priority interrupt – Direct memory access.

Text Books

S.No.	Author	Title of book	Publisher	Year of Publication
1.	Donald P. Leach and Albert Paul Malvino	Digital Principles and Application (Units I, II, III, IV)	Tata McGraw-Hill	2011
2.	Morris Mano	Computer System Architecture (Unit V)	International Edition	3 rd Edition 2014

Reference Book

1.	Thomas C. Bartee	Computer Architecture and Logic Design	McGraw Hill International Edition	1991
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	S	M	S	S	M
CO3	S	M	M	S	S
CO4	M	S	S	M	S
CO5	S	S	M	S	M

S- Strong; **M-**Medium

SEMESTER – I

Core Course - II	BCA	2019 - 2020
M19UCA02	PROGRAMMING IN C	
Credit: 4		

Objectives

This course introduces fundamental concepts such as arrays, structures. It covers concepts such as arrays, pointers and file handling methods. It provides technical skills to design and develop various applications.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the logic behind the execution of various applications	K1
CO2	Understand the concepts of C programming	K2
CO3	Analyze and discover bugs in the program	K4
CO4	Develop an application using memory management functions.	K4
CO5	Apply the concepts to solve a real-time problem	K3

UNIT I

Overview Of C: Introduction - character set - C tokens - keyword & identifiers – constants – variables - data types – Declarations of variables – Arithmetic, Relational, Logical, Assignment, conditional, Bit wise, special, increment and decrement operators - Arithmetic expressions - Evaluation of expression - Operator precedence & associativity - Mathematical functions - Reading & writing a character - input and output statements.

UNIT II

Decision making statements: If – If-else, Switch, Break, Continue - The ?: operator - The GOTO statement – **Loop Control Statements:** For, Nested For loops – While, do-while statements – **Arrays:** One- dimensional - Two dimensional - Multidimensional arrays.

UNIT III

Character string handling: Declaring and initializing string variables - Reading strings from terminal - Writing strings to screen - String handling functions - **User-defined functions:** Need for user defined functions – Types of functions - Recursion

UNIT IV

Structures: Definition- Structure initialization - Arrays of structures - Arrays within structures – Unions. **Pointers:** understanding pointers - accessing the address of a variable - declaring and initializing pointers - accessing a variable through its pointers - pointer expressions.

UNIT V

File Management in C: Defining and opening a file - closing file - I/O operations on files - Error handling during I/O operations - Random access to files.

Text Book

S.No	Author	Title of the book	Publisher	Year of publication
1.	E. Balagurusamy	Programming In ANSI C	Tata Mc Graw Hill	7 th Edition,2017

Reference Books

1.	Byron Gottfried	Programming with C	Tata McGraw Hill,	3 rd Edition,2013
2.	Yashwant Kanetkar	Let us C	BPB Publications,	13 th Edition, 2014
3.	Martin J. Gentile	An Easy Guide to Programming in C	Create Space Independent Publishing Platform,	2 nd Edition, 2012

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	S	S	M	S	M
CO3	M	M	S	M	M
CO4	S	S	M	S	S
CO5	M	M	S	S	M

S- Strong; **M**-Medium

SEMESTER I

Core Practical - I	BCA	2019 - 2020
M19UCAP01	PRACTICAL – I - PROGRAMMING IN C	
Credit: 2		

Objectives

This course introduces the concepts of C programming. It provides technical skill, basic concepts like control statements, pointers, structures and file handling techniques.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the mathematical functions while creating a program	K1
CO2	Understand the fundamental programming concepts	K2
CO3	Illustrate the programming technique to analyze software problems	K2
CO4	Apply the concepts to find solution for the problems	K3
CO5	Design and develop the simple application.	K3

1. Program to read & calculate all types of operators.
2. Program to find the greatest among three numbers using IF statement.
3. Program to generate the Fibonacci series using For statement.
4. Program to Sort numbers in ascending order using Arrays.
5. Program to apply String handling functions.
6. Program to Sort names in alphabetical order using strings.
7. Program to find Factorial using functions.
8. Program to swap two numbers using pointers.
9. Program to find the simple interest using structures.
10. Program to display ODD & EVEN numbers using files.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	M	S	M	M	S
CO3	S	M	M	S	S
CO4	S	S	M	M	M
CO5	M	S	S	M	S

S- Strong; **M**-Medium

SEMESTER II

Core Course - III	BCA	2019 - 2020
M19UCA03	DATA STRUCTURES	
Credit: 4		

Objectives

To understand the concepts of Data Structures and Algorithms.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the algorithm concepts	K1
CO2	Understand the Array representations	K2
CO3	Apply the concepts of Linked List	K4
CO4	Understand Tree and its traversal methods	K2
CO5	Analyze sorting and searching techniques	K3

Unit - I

Algorithms: Algorithms (Analysis and Design) – Problem Solving – Top-down and Bottom-up approaches to algorithm design – Use of algorithms in Problem Solving - Design of Algorithms – Efficiency analysis of Algorithms.

Basic Concepts: Abstract Data Type (ADT) – Fundamentals and Derived Data Types- Primitive Data Structures.

Unit – II

Arrays: Introduction of an Array – Representation of Arrays - Multidimensional Arrays – Operations on Arrays – Application of Arrays – Strings as an Array of Characters – String Manipulation - Calling functions Using Arrays.

Unit - III

Linked lists: Introduction – Representation of Linked List - Types of linked list – Implementation of Linked List - Operations performed on linked list. **Stacks:** Introduction – Representation Stacks - Implementation of Stack. **Queues:** Introduction – Representation of Queues - Implementation of Queues.

Unit - IV

Trees: Introduction - Binary tree – Tree Traversal – Recursive Algorithms – Non Recursive Traversal of a Binary tree – Binary tree representation – Application of Binary Trees - Binary search trees – B-tree.

Unit - V

Searching and Sorting: Sequential and binary search – Indexed search
Sorting: Selection sort – Bubble Sort – Quick sort – Merge sort. **Graphs:** Introduction – Graph representation – Traversal schemes – Spanning tree – Applications of graphs.

Text Book

S.No.	Author	Title of Book	Publisher	Year of Publication
1.	Seymour Lipschitz	Data Structures with C	Tata McGraw Hill	2011

Reference Books

1.	A. V. Aho, J. E. Hopcroft, and J. D. Ullman	Data Structures and Algorithms	Pearson Education	2003
2.	R. F. Gilberg, B. A. Forouzan	Data Structures	Thomson India Edition	2005

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
C01	S	S	M	S	M
C02	S	N	M	S	S
C03	M	S	S	S	M
C04	M	S	S	M	S
C05	S	M	M	S	S

S- Strong; **M-**Medium

SEMESTER II

Core Course – IV	BCA	2019 - 2020
M19UCA04	OBJECT ORIENTED PROGRAMMING WITH C++	
Credit: 4		

Objectives

This subject is designed to provide the graduates with why and how of Object-oriented programming in C++. It also presents the concept of Object-oriented programming with a brief discussion on the important elements of Object-oriented programming analysis and design of systems with its Object-oriented programming capabilities, C++ offers significant software engineering benefits over C.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Identify the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable codes.	K1
CO2	Understand classes and objects written by other programmers when constructing their system.	K2
CO3	Analyze C++ features to program design and implementation	K4
CO4	Apply the object oriented design for small/medium scale problems.	K3
CO5	Analyze & Apply the Managing console I/O operations.	K4

UNIT I

Principles of Object Oriented Programming: OOPs Paradigm – Basic Concepts of OOP – Benefits of OOP – Applications of OOP - **Elements of C++:** Tokens – Keyword – Identifier and Constants – Symbolic Constants - **Basic Data Types:** User – Defined Data Types – Derived Data Types – Variables: Declaration – Initialization and Reference.

UNIT II

Operators in C++ - Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator -Expressions and their Types – Special Assignment Expressions – Control Structures.

UNIT III

Functions in C++: The Main Function – Prototyping – Call by Reference – Return by Reference – Inline Functions – Default Arguments – const Arguments – Recursion - Function Overloading – Friend and Virtual Functions – Classes and Objects.

UNIT IV

Constructors and Destructors: Constructors – Parameterized and Multiple Constructors – Constructors with Default Arguments – Dynamic Initialization – Copy and Dynamic Constructors – Destructors. **Operator Overloading:** Defining operator overloading – Unary and Binary Operator Overloading – Manipulation of Strings – Rules for Overloading – Type Conversion – Inheritance Extending.

UNIT V

Classes: Defining Derived Classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritances – Hierarchical Inheritance – Hybrid Inheritance. **Exception Handling:** Basics of Exception Handling – Exception Handling Mechanism – Throwing and Catching Mechanism – Specifying Exceptions.

Text Book

S.No.	Author	Title of the book	Publisher	Year of publication
1.	E.Balagurusamy	Object Oriented Programming with C++	Tata Mc Graw Hill Publications	6 th Edition 2013

Reference Books

1.	Bjarne Stroustrup	The C++ Programming Language	Pearson Education	4 th Edition 2014
2.	Tony Gaddis, Judy Walfers, GodferyMuganda	Starting Out with C++: Early Objects	Addison-Wesley publication	8 th Edition 2013

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	M	M	M	M
CO3	M	S	S	S	S
CO4	S	S	S	M	S
CO5	M	S	M	M	S

S- Strong; **M**-Medium

SEMESTER II

Core Practical - II	BCA	2019 - 2020
M19UCAP02	PRACTICAL – II – DATA STRUCTURES USING C++	
Credit: 2		

Objectives

This course introduces the concepts of C++ programming. It provides technical skill, basic concepts like control statements, pointers, structures and file handling techniques.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Recall the mathematical functions while creating a program	K1
CO2	Understand the fundamental programming concepts	K2
CO3	Analyze the data structure technique to software problems	K3
CO4	Apply the concepts to find solution for the problems	K4
CO5	Analyze to design and develop the simple application.	K3

1. Write a program to sort numbers in ascending order using arrays in C++.
2. Create a program to add two matrices using arrays in C++.
3. Write a C++ program to implement Stack operations.
4. Write a C++ program to implement Queue operations.
5. Write a C++ program to implement Single linked list.
6. Create Binary tree traversal program using C++.
7. Write a C++ program to implement Binary search.
8. Write a C++ program to implement Merge sort.
9. Write a C++ program to implement Quick sort.
10. Write a program to implement graph representation.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	M	S	M	M	S
CO3	S	M	M	S	S
CO4	M	S	M	M	M
CO5	S	S	S	M	S

S- Strong; M-Medium

SEMESTER III

Core Course - V	BCA	2019 - 2020
M19UCA05	RELATIONAL DATABASE MANAGEMENT SYSTEMS	
Credit: 4		

Objectives

This course provides students basic knowledge and skills on Data storing and retrieving. This course covers ER-Model, Aggregate Function, Normalization and PL/SQL statements.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the Database Architecture.	K1
CO2	Understand the basic structure of SQL queries.	K2
CO3	Analyze Control Structures and Embedded SQL	K4
CO4	Apply PL/SQL Queries for making secure data backup	K3
CO5	Analyze Granting and Revoking Privileges and roles	K4

Unit - I

Introduction: Database system Application – Purpose of Database Systems- View of Data – Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management- Retrieval - Database Users and Administrators. **Relational Databases:** introduction to the Relational Model ER-Model: Structure of Relational Databases - Database Schema – Keys.

Unit - II

Introduction to SQL: Overview of the SQL Query Language – SQL Data Definition - Basic Structure of SQL Queries – Additional Basic Operation - Set Operations – Null Values – Aggregate Functions - Nested Sub queries – Modification of the Database. **Intermediate SQL:** Joined Relations - Views - Transactions – Authorization.

Unit – III

Data Normalization: Pitfalls in Relational Database Design- Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form – **Database Security:** Data Security

Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and roles – Data Encryption – Network Security.

Unit - IV

PL/SQL: A Programming Language: Fundamentals of PL/SQL – PL/SQL Block Structure – Comments - Data Types – Other Data Types – Variable Declaration – Anchored Declaration – Assignment Operation – Bind Variables - Substitution Variables in PL/SQL – Printing in PL/SQL – Arithmetic Operators – **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation in PL/SQL – Transaction Control Statements.

Unit - V

PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors - Explicit Cursors – Explicit Cursor Attributes – Implicit Cursor Attributes - Cursor for Loops – Exceptions – Types of Exceptions. **PL/SQL Composite Data Types: Records, Tables and V arrays:** Composite Data Type – PL/SQL Records – PL/SQL Tables - PL/SQL V arrays. **PL/SQL Named Blocks: Procedures, Functions, and Packages & Triggers:** Procedures – Functions – Packages – Triggers.

Text Books

S.No.	Author	Title of the Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Henry F.Korth, S.Sudarshan	Database system Concepts	TMH	2010
2.	Alexis Leon, Mathews Leon	Fundamentals of Database Management Systems	Vijay Nicole Imprints Private Limited	2010
3.	Nilesh shah	Database Systems Using Oracle-A simplified Guide To SQL and PL/SQL	PHI	2005

Reference Book

1.	Ramakrishnan, Gehrke	Database Management Systems	McGraw Hill	2004
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	S
CO2	S	M	M	S	S
CO3	M	S	M	S	S
CO4	S	S	S	M	S
CO5	S	M	S	M	M

S- Strong; **M**-Medium

SEMESTER III

Core Course – VI	BCA	2019 - 2020
M19UCA06	OPERATING SYSTEMS	
Credit: 4		

Objectives

To provide the Fundamental Concepts of Operating System.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the concept of Operating Systems	K1
CO2	Understanding the Process management	K2
CO3	Applying the Process Synchronization	K3
CO4	Analyze the Memory management	K4
CO5	Apply the Storage, File Management	K3

Unit I

Introduction: What Operating System do – Computer system organization – computer system architecture – operating system operations – **Operating system structures:** Operating system services – User and operating system interface – System calls – Types of system calls – System programs.

Unit II

Process Management: Process Concepts – Process scheduling – Operations on processes – Interprocess communications- **Threads:** Overview – Multicore programming – Multithreading models – thread libraries – Implicit threading – thread issues.

Unit III

Process Synchronization: Critical section problem – synchronization hardware – semaphores – **CPU Scheduling:** Scheduling criteria – scheduling algorithms – thread scheduling – multiprocessor scheduling. **Deadlock:** **Deadlock** Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

Unit IV

Memory Management: Main memory: Swapping - Contiguous Memory Allocation - Segmentation - Paging - Structure of the Page Table.
Virtual Memory: Demand Paging - Page Replacement - Allocation of Frames - Thrashing - Memory Mapped Files.

Unit: V

Storage Management: Disk Structure - Disk Scheduling - Disk Management - Swap-Space Management - RAID Structure. **File System Interface:** File Concept- Access Methods - Directory and Disk Structure.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Operating System Concepts	John Wiley & Sons, Inc.	9 th Edition, 2013

Reference Book

1.	Achyut Godbole and Atul Kahate	Operating Systems	McGraw Hill Publishing	2010
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	S	M
CO2	S	S	M	S	S
CO3	M	S	M	M	M
CO4	S	M	S	M	S
CO5	S	M	S	S	M

S- Strong; **M-**Medium

SEMESTER III

Core Course – VII	BCA	2019 - 2020
M19UCA07	COMPUTER GRAPHICS	
Credit: 4		

Objectives

This course covers the computer graphics display devices. It covers the drawing, clipping algorithms, 2D transformations. It focuses on interactive input methods and functions in computer graphics

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Describe the graphics techniques used in various applications and display devices.	K1
CO2	Differentiate the concept of drawing algorithms, rotation and transformation	K2
CO3	Demonstrate the concepts of various clippings and transformations	K3
CO4	Illustrate the various input devices used in graphics	K3
CO5	Apply the two dimensional, Three dimensional concepts using algorithm and display methods	K3

UNIT – I

Basic Concepts: Uses of computer graphics –Display devices - Color CRT monitors –Direct view storage tube –Flat panel displays – Raster scan systems - Random scan system, Input and Hard copy device

UNIT – II

Line drawing algorithms: DDA algorithm, Bresenham's line drawing algorithm, Parallel line algorithms – Circle generating algorithms: Properties of circles, Midpoint circle algorithm.

UNIT – III

Two dimensional transformations: Basic transformations - Composite transformation of translation, Rotation, Scaling –General Pivot point rotation – General fixed point scaling

UNIT – IV

Two dimensional viewing: Clipping Operations – Point clipping – Line clipping: Cohen Sutherland line clipping - Curve clipping – Text clipping – Exterior clipping.

UNIT – V

Three dimensional concepts: Three dimensional display methods –
Three dimensional geometric and modeling transformations: Translation, Rotation and Scaling

Text Book

S. No.	Author	Title of Book	Publisher	Year of Publication
1.	Donald Hearn M.Pauline & Baker	Computer Graphics – C Version	Pearson Education Publication	2 nd Edition, 2008

Reference Book

1.	Udit Agarwal	Computer Graphics	S K Kataria & Sons	2013
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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	M
CO3	S	M	S	M	S
CO4	M	S	M	S	S
CO5	S	M	S	M	M

S-Strong; M-Medium

SEMESTER III

Core Practical - III	BCA	2019 - 2020
M19UCAP03	PRACTICAL - III - ORACLE	
Credit: 2		

Objectives

Experience to the learners in SQL, PL/SQL programming based on concept learned with program course. Implementation of RDBMS commands such as DDL, DML, and DCL. Implementation of PL/SQL programming such as procedure, trigger and cursor.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the table creation and key Constraints.	K1
CO2	Understand and explain the underlying concepts of database technologies	K2
CO3	Analyze a database using SQL DML/DDL commands.	K4
CO4	Apply the PL/SQL Commands.	K3
CO5	Analyze the cursors & Exceptions, Composite Data types.	K4

1. Table Creation using various constraints.
2. Apply the constraints like Primary key, Foreign Key, Not Null to the tables.
3. Write the queries to implement the joins.
4. Write the queries for implementing the Aggregate functions.
5. Write a SQL statement for Nested sub queries.
6. Write a PL/SQL program of Employee's Pay Bill.
7. Write a PL/SQL program to calculate the area of circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table name areas.
8. Write a PL/SQL block to display electricity bill for the electricity consumers. The database should consist of consumer-no, name, add, units consumed. Insert the data of ten consumers and calculate the bills (Rules: First 100 units Rs. 6 per unit, 100 to 200 units Rs 8 per unit, Beyond 200 units Rs. 10 per unit)
9. Write a PL/SQL program of Student Details using Triggers.
10. Write a PL/SQL program of Voters Details using V-arrays.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	M	S	S	S	M
CO3	M	M	S	S	M
CO4	M	S	M	S	S
CO5	S	M	S	M	S

S- Strong; **M**-Medium

SEMESTER – IV

Core Course- VIII	BCA	2019 – 2020
M19UCA08	PROGRAMMING IN JAVA	
Credit: 4		

Objectives

The course is an expository of the object-oriented programming methodology with emphasis on software design and code reuse as its core objectives. Language elements include loops, arrays, input/output structures, events, exceptions, and threads. It aims to develop the student's logical, critical thinking and problem solving skills on programming basics.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic Java language constants, variables and data types	K1
CO2	Analyze decision making branching and looping	K4
CO3	Apply the principles of classes, objects and methods	K3
CO4	Analyze interfaces , packages, multithreaded programming	K4
CO5	Apply the exception and Applets	K3

UNIT I

Java Evolution: Introduction-Java features- Java Program Structure-Java Tokens-Java Statements-JVM- Command Line Arguments. **Constants, Variables & Data Types:** Constants-Variables-Data Types-Declaration of Variables-Giving Values to Variables-Scope of Variables-Symbolic Constants-Type Casting - Operators and Expressions.

UNIT II

Decision Making and Branching Statements: IF, Nested IF, Switch and Ternary Operator- **Decision Making and Looping:** The While Statement-The Do statement-The For Statement -Jump in Loops and Labeled Loops.

UNIT III

Classes, Objects and Methods: Introduction-Defining a Class – Method Declarations-Creating Objects- Accessing Class Members-Constructors-Methods Overloading-Static Members-Nesting of Methods-Inheritance-Overriding Methods-Final Classes-Abstract Methods and Classes.

UNIT IV

Interfaces: Introduction-Defining, Extending and Implementing Interfaces-Accessing Interfaces- **Packages:** Introduction-Creating, Accessing and Using a Package-Adding a Class to a Package. **Multithreaded Programming:** Creating Threads-Life Cycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority.

UNIT V

Managing Errors and Exceptions: Types of Errors-Exceptions-Multiple Catch Statements-Using Finally Statement-Throwing Our Own Exceptions. **Applet Programming:** Building Applet Code-Applet Life Cycle-Creating an Executable Applet- Designing a Web Page–Applet Tag-Adding Applet to Html File-Running the Applet.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	E. Balaguruswamy	Programming with JAVA - A Primer	McGraw Hill Professional	2015

Reference Books

1.	Herbert Schildt	Java: The Complete Reference	McGraw Hill Professional	2017
2.	Robert Sedgewick & Kevin Wayne	Introduction to Programming in Java	Addison Wesley	2017
3.	Y. Daniel Liang	Introduction to Java Programming, Brief Version	Pearson Education	2017

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	M	S	M	M	S
CO3	S	M	S	S	M
CO4	M	S	M	M	S
CO5	S	M	S	S	M

S- Strong; **M**-Medium

SEMESTER – IV

Core Course – IX	BCA	2019 - 2020
M19UCA09	CLIENT / SERVER TECHNOLOGY	
Credit: 4		

Objectives

The course is designed to develop a basic understanding of how to design a Client Server application. This course is to provide students with an overview of the concepts and fundamentals of client/server computing and network operating system.

Course Outcomes

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

CO	Statement	Knowledge level
CO1	Identify the importance of client/server components, the role of client and server.	K1
CO2	Understand the principles behind the client/server technology and its uses.	K2
CO3	Design and implement a client-server internet application	K3
CO4	Analyze the ability in creativity & model requirements and constraints for the purpose of designing and implementing application.	K4
CO5	Analyze problems and synthesis suitable solutions and applications service and support	K4

UNIT I

Client/Server computing: – Advantages of Client / Server Computing – Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic

UNIT II

The Client: Role of a Client –Client Services – Request for Service. Components of Client/Server Applications – The Server: The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.

UNIT III

Connectivity: Open System Interconnect – Communications Interface Technology – Inter process communication – WAN Technologies.

UNIT IV

Software: Factors driving demand for application software development – Rising Technology Staff costs – Need to improve Technology – Need for Common Interface across Platforms –Client/Server System Development Methodology.

UNIT V

Hardware: Hardware/Network Acquisition – PC-Level Processing Units – Macintosh, notebooks, Pen –UNIX Workstation – x-terminals –Disk, Tape.
Client/Server Computing: Enabling Technologies –Transformational Systems.

Text Book

S No	Author	Title of Book	Publisher	Year of Publication
1.	Patrick Smith, Steve Guengerich	Client/Server Computing	Prentice Hall of India Private Limited, New Delhi, 2ndEdition	2011

Reference Books

1.	Dan Harkey, Jeri Edwards	Client/Server survivalGuide	Wiley Computer Publishing	2009
2.	Neil Jenkins	Client/Server Unleashed	Sams Publishing	2008
3.	Devendra Kumar	Client/Server Computing	Global Academic Publishers & Distributors	2015

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	S	M	S	M
CO3	M	S	M	S	S
CO4	S	M	S	M	S
CO5	M	S	M	S	M

S-Strong; M-Medium

SEMESTER IV

Core Course – X	BCA	2019 - 2020
M19UCA10	SOFTWARE ENGINEERING	
Credit: 4		

Objectives

This course provides the basic concepts of software engineering to design a new software project and develops skills to construct software of high quality. This Course also covers the fundamental techniques for modeling software requirements, analysis and design.

Course Outcomes

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

CO	Statement	Knowledge level
CO1	Remember the basics of Software engineering and Life cycle models	K1
CO2	Understand the concept of requirement analysis and specification	K2
CO3	Understand the concept of function oriented software design and SA/SD methodologies	K2
CO4	Apply the concept of user interface design and coding and testing	K3
CO5	Analyze the concept of software reliability and quality management	K4

UNIT I

Introduction: Software Engineering Discipline - Evolution and Impact - Programs Vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical Waterfall Model - Iterative Waterfall Model - Prototyping Model - Evolutionary Model - Spiral Model. Software Project Management: Responsibilities of a Software Project Manager - Project Planning - Project Estimation Techniques -Risk Management.

UNIT II

Requirements Analysis and Specification: Requirements Gathering and Analysis - Software Requirements Specification (SRS) - Formal System Development Techniques. **Software Design:** Characteristics of a Good Software Design - Cohesion and Coupling - Neat Arrangement - Software Design Approaches.

UNIT III

Function-Oriented Software Design: Overview of SA/SD Methodology - Structured Analysis - Data Flow Diagrams (DFDs). **Object Modeling Using UML:** Overview of Object - Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.

UNIT IV

User Interface Design: Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces - Component-Based GUI Development; Coding and Testing: Coding - Testing - UNIT Testing - Black-Box Testing - White-Box Testing - Debugging - Integration Testing - System Testing.

UNIT V

Software Reliability and Quality Management: Software Reliability - Statistical Testing - Software Quality - Software Quality Management System - ISO 9000. **Computer Aided Software Engineering:** CASE Environment - CASE support in Software Life Cycle - Characteristics of CASE Tools - Architecture of a CASE Environment. **Software Maintenance:** Characteristics of Software Maintenance - Software Reverse Engineering.

Text Book

S.No.	Author	Title of the book	Publisher	Year of publication
1.	Rajib Mall	Fundamentals of Software Engineering	Prentice Hall of India Private Limited	4thEdition 2014

Reference Book

1.	Richard Fairley	Software Engineering Concepts	TMGH Publications	2004
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Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	S
CO3	M	S	M	S	M
CO4	S	M	S	M	S
CO5	M	S	M	S	M

S-Strong; M-Medium

SEMESTER – IV

Core Practical - IV	BCA	2019 – 2020
M19UCAP04	PRACTICAL - IV - PROGRAMMING IN JAVA	
Credit: 2		

Objectives

Implement object oriented programming concepts. Create package and interfaces in a Java program. Use graphical user interface in Java programs and create applets.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Understand the operators	K2
CO2	Understand the concept of Decision making	K2
CO3	Apply the principles of object and methods	K3
CO4	Analyze the multithreading, exception handling concepts	K4
CO5	Apply programming skills to applet	K3

1. Create a program to perform all types of operators.
2. Create a program to perform Decision Making Statements.
3. Create a program using For Looping Statements.
4. Create a program to perform Class and Objects.
5. Create a program to implement String handling Functions.
6. Create a program to implement Interface.
7. Create a program to implement Packages.
8. Program to create Threads using Multithreading.
9. Program to display any three types of Exceptions.
10. Create a program to implement applets.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	S	S	M	M	S
CO3	M	M	S	S	S
CO4	S	S	M	M	M
CO5	M	S	S	M	S

S- Strong; **M**-Medium

SEMESTER – V

Core Course - XI	BCA	2019 - 2020
M19UCA11	WEB TECHNOLOGY	
Credit: 5		

Objectives

This course gives the basic principle, strategies and methodologies of web application development. The Course is designed to develop dynamic web page using scripting languages and various styles with CSS and HTML5.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the knowledge about HTML document with element types, hyperlinks, images, list, tables and forms	K1
CO2	Understand the concept of CSS for dynamic presentation effect in HTML and XML documents	K2
CO3	Understand the mark-up languages for processing, identifying and presenting information in web pages.	K2
CO4	Analyze scripting languages in HTML document to add interactive components to web pages.	K3
CO5	Analyze the web technology concept to create schemas and dynamic web pages.	K3

Unit I

Fundamentals of HTML: Understanding Elements - Root Elements-Metadata Elements-Section Elements-Heading Elements-Describing data types.

Unit II

HTML 5: HTML5 and its essentials - Exploring New Features of HTML5-Next Generation of Web Development-Structuring an HTML Document-Exploring Editors and Browsers Supported by HTML5-Creating and Saving an HTML Document-Validating an HTML Document-Viewing an HTML Document-Hosting Web Pages.

Unit III

DHTML: Introduction - Cascading Style sheets –DHTML Document Object Model and collections – Event Handling -Filters and Transitions - Data Binding.

Unit IV

Scripting Languages: JavaScript: Introduction-Language Elements - Objects of JavaScript-Other Objects. **VB Script:** Introduction-Embedding VB Script Code in an HTML Document-Comments-Variables-Operators-Procedures Conditional Statements- Looping Constructs -Objects and VB Script -Cookies.

Unit V

Extensible Mark-Up Language (XML): Introduction-HTML vs. XML-Syntax of the XML Document - XML Attributes - XML Validation - XML DTD-The Building Blocks of XML Documents - DTD Elements- DTD Attributes-DTD Entities-DTD Validation–XSL-XSL Transformation.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	N.P.Gopalan, J.Akilandeswari	Web Technology A Developer's Perspective	PHI Learning _Pvt.,Ltd	4 th Edition 2011

Reference Books

1.	Kogent Learning Solutions Inc	HTML5 Black Book	Prentice Hall PTR	Dreamtech Press
2.	Akanksha Rastogi	Web Technology	K.Nath & Co Educational Publishers	1 st Edition 2012
3.	Anuranjan Misra, Arjun Kumar Singh	Intoduction to Web Technology	Laxmi Publication	2011
4.	C.Xavier	World Wide Web Design with HTML	TMH Publishers	2008

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	S	M	S	S	M
CO3	M	S	M	M	S
CO4	S	M	S	S	M
CO5	M	S	M	S	S

S- Strong; **M**-Medium

SEMESTER - V

Core Course - XII	BCA	2019 - 2020
M19UCA12	.NET PROGRAMMING	
Credit: 5		

Objectives

This course introduces fundamental and advanced level concepts of .Net. It covers concepts such as fundamental concepts of the Application, various objects, controls used in VB.Net, ASP.Net and information retrieval from database using ADO.Net. It provides Project development skills to understand and develop various ideas about VB.Net and ASP.Net.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the concept of .Net Programming	K1
CO2	Understand the Web Programming basics	K2
CO3	Analyze the web page creation techniques	K3
CO4	Understand the Database connectivity using ADO.Net	K2
CO5	Apply the windows and web based programming	K4

Unit I

Getting Started with Visual Basic 2008 (VB.Net): Exploring the IDE – Understanding the IDE components – Setting Environment options - **Variables and Data types:** Variable – Variables as objects – Constants – Arrays. **Programming Fundamentals:** Flow control statements – Decision Statements – Loop Statements – Nested Control statements – Exit statement - Subroutines – Functions - Arguments – Arguments passing mechanism – Built in functions.

Unit II

Basic Windows Controls: Textbox control – The List box, Checked List box, and Combo box controls- Scrollbar and track bar controls. **Working with forms:** Properties of form – placing controls on forms – The forms event – Loading and showing forms – Designing menus - The menu editor.

Unit III

Tree view and List view Controls: The tree view control – The list view control. **Handling String, Characters and Dates:** Handling strings and characters – Handling Dates and times. **Programming with ADO.Net:** The Basic data access classes – Storing data in Datasets – Update Operations. **Building Data bound applications:** Working with typed dataset – Data Binding.

Unit IV

Introduction to ASP.Net 3.5 – C# and ASP.Net 3.5: Basic C# Structures – Operators and punctuators – Conditional statements. **Forms and Controls:** HTML Forms A Review – Standard web controls – validation controls.

Unit V

ASP.Net and Database: A SQL Primer – Writing SQL commands – Adding data to a table with insert – Looking into a table with select and from – Changing data with update. **ADO.Net: Hello Database:** Creating a database – Creating websites for database use – Entering data from a website.

Text Books

S.No	Author	Title of the Book	Publisher	Year of Publication
1.	Evangelos Petroustos	Mastering Microsoft Visual Basic 2008 (Units I, II,III)	Wiley Publishing	2008 Edition.
2.	William B.Sanders	ASP.NET 3.5 A Beginners Guide (Units IV,V)	Mcgraw Hill Edition	2009 Edition

Reference Books

1.	Jeffrey R. Shapiro	Complete Reference VB.Net	TMH	2002
2.	Dave Grundgeiger	Programming Visual basic .Net	O'Reilly Publisher,	2002 Edition.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	S
CO2	S	M	M	S	M
CO3	M	S	M	S	S
CO4	S	M	S	M	S
CO5	M	S	M	S	M

S- Strong; **M**-Medium

SEMESTER V

Core Course - XIII	BCA	2019 - 2020
M19UCA13	DATA COMMUNICATION AND NETWORKING	
Credit: 4		

Objectives

To understand the Design and Organization of Data Communication and Networking

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the Data Communication Network Concepts	K1
CO2	Understand the Data Link Layers	K2
CO3	Analyze the Network Layer Services	K3
CO4	Understand the Transport Layer	K2
CO5	Applying the Client Server Error detections	K4

Unit I

Overview and Physical Layer: Introduction: Data Communications - Networks - Network Types, Network Models: The OSI Model- Multiplexing- **Transmission Media:** Guided Media-Unguided Media - **Switching:** Circuit Switched Network-Packet Switching.

Unit II

Data Link Layer: Error Deduction and Correction: Introduction- Cyclic codes- Forward error correction, Data link Control: Data link layer protocols- **Wireless Networks:** IEEE 802.11- Bluetooth-Cellular Telephone- Satellite network- Connection devices.

Unit III

Network Layer Services: Packet Switching- Network layer performance- IPV4 Addresses- Internet Protocol-**Routing Algorithms:** Adaptive Algorithms: Isolated, centralized, Distributed -**Non Adaptive Algorithms:** Flooding.

Unit IV

Transport Layer: Transport Layer Protocols- User Datagram Protocol - TCP: TCP Services TCP features - Windows in TCP - Flow Control - Error Control- TCP Congestion Control.

Unit V

Application Layers: Client Server Programming - World Wide Web & HTTP - FTP - Email – DNS.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Behrouz A Forouzan	Data Communications and Networking	Tata McGraw Hill	5 th Edition 2013

Reference Book

1.	Achyut Godbole and Atul Kahate	Data Communications and Networks	McGraw Hill Education	2011
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	S
CO2	M	S	S	M	M
CO3	M	S	M	S	S
CO4	S	M	S	M	M
CO5	S	M	M	S	S

S- Strong; **M-**Medium

SEMESTER V

Core Practical - V	BCA	2019 - 2020
M19UCAP05	PRACTICAL – V - WEB TECHNOLOGY	
Credit: 2		

Objectives

To understand the Design of HTML with Java and VB Scripting languages

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic idea about HTML	K1
CO2	Understand the concept of Web Page creation using scripting	K2
CO3	Understand the basics of Java and vb scripting	K3
CO4	Analyze the Various controls used in HTML and DHTML	K4
CO5	Apply the concepts of real time web page	K3

1. Create a simple webpage using Formatting Tags.
2. Create a webpage to display student details using table tags.
3. Create a webpage to implement image, background color and text.
4. Create a webpage using Radio buttons, Check boxes and List boxes.
5. Create a website to display date and time using java script.
6. Create a simple website using Cascading Style Sheets.
7. Create a website to validate user information using java script.
8. Create a website to pass user information to another page using cookies and vb script
9. Create a webpage to implement event using vb script
10. Create a webpage using DHTML with HTML

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	S	M	S	S	M
CO3	M	S	M	M	S
CO4	S	S	M	S	M
CO5	S	S	S	M	S

S- Strong; **M**-Medium

SEMESTER - V

Core Practical - VI	BCA	2019 - 2020
M19UCAP06	PRACTICAL – VI - .NET PROGRAMMING	
Credit: 2		

Objectives

This Lab introduces fundamental and advanced level concepts of .Net. It covers concepts such as fundamental concepts of the Application, various objects, controls used in VB.Net, ASP.Net and information retrieval from database using ADO.Net.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic idea about .Net	K1
CO2	Understand the concept of Web Programming	K2
CO3	Understand the basics of Database connectivity using ADO.Net	K2
CO4	Analyze the Various controls used in VB.Net and ASP.Net	K4
CO5	Apply the concepts of real time applications	K3

1. Write a VB.NET program to get student details using all controls.
2. Write a VB.NET program to change the background color of a form using track bar and scrollbar controls.
3. Write a VB.Net program for performing Calculator application.
4. Create ASP.Net Program to create simple webpage using various controls.
5. Create ASP.Net program using Validation controls
6. Create ASP.Net program using Application and Session variables.
7. Write a VB.NET program to perform login authentication using ADO.Net.
8. Write a VB.Net Program for Employee Information System using ADO.Net.
9. Create ASP.Net Program for Online Quiz using ADO.Net.
10. Create ASP.Net program for Online Book store using ADO.Net.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	S
CO2	S	M	S	M	S
CO3	M	S	M	S	M
CO4	S	M	S	M	S
CO5	M	S	S	S	M

S- Strong; **M**-Medium

SEMESTER VI

Core Course - XIV	BCA	2019 - 2020
M19UCA14	PYTHON PROGRAMMING	
Credit: 5		

Objectives

To understand the concepts of Python Programming

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the Basic Concept of Python	K1
CO2	Understand the Conditional Execution, Iteration	K2
CO3	Applying the Mathematical functions, Writing Functions.	K3
CO4	Analyze the List Processing	K4
CO5	Applying the object and Exception Handling	K3

UNIT I

Values and Variables: Integer Values-Variables and Assignments-Identifiers-Floating Point Types-Control Codes with Strings-User Input-The eval Function-Controlling the print Function. **Expression and Arithmetic:** Expression-Operator Precedence and associatively- Comments- Errors-Arithmetic Examples-More Arithmetic Operators-Algorithms.

UNIT II

Conditional Execution: Boolean Expressions- Simple if Statements-The if/else Statements-Compound Boolean Expressions-Nested Conditionals- Multi-way Decision Statements-Conditional Expressions-Errors in Conditional Statements. **Iteration:** The While Statement- Definite Loop vs Indefinite Loop-The For Statement-Nested Loops-Abnormal Loop Termination- Infinite Loop-Iteration Examples.

UNIT III

Using Functions: Introduction to Using Functions-Standard Mathematical Functions-Time Functions-Random Numbers-Importing Issues. **Writing Functions:** Function Basics- Using Functions- Main Functions-Parameter Passing-Function Examples- Custom Functions vs. Standard Functions. **More on Functions:** Global Variables- Default Parameters-Recursion.

UNIT IV

Lists:

Using List- List Assignment and Equivalence – List Bounds- Slicing - Lists and Functions- Prime Generation with a List.**List Processing:** Sorting-Flexible Sorting- Search- List Permutations- Randomly Permuting a List- Reversing a List.

UNIT V

Classes and Objects: Using Objects- String Objects- List Objects. **Custom Types:** Geometric Points- Methods- Custom Type Examples- Class Inheritance. **Handling Exceptions:** Motivation- Exception Examples- Using Exceptions - Custom Exceptions.

Text Book

S. No.	Author	Title of the Book	Publisher	Year of Publication
1.	Richard L. Halterman	Learn to Program with Python	Southern Adventist University	3 th Edition 2010

Reference Book

1.	Wesley J. Chun	Core Python Programming	Prentice Hall	2 th Edition 2011
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	S
CO2	S	M	M	S	M
CO3	M	S	M	M	S
CO4	S	S	M	S	M
CO5	S	M	S	M	S

S- Strong; **M**-Medium

SEMESTER - VI

Core Course – XV	BCA	2019 - 2020
M19UCA15	DATA MINING	
Credit: 5		

Objectives

To gain knowledge of data mining concepts, techniques in data mining. Web mining and open source tools to manipulate data mining applications. To provide knowledge on Data warehousing and machine learning applications.

Course Outcomes

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

CO	Statement	Knowledge level
CO1	Understand the introduction to data mining and data mining techniques	K2
CO2	Apply the association rule like apriori algorithm	K3
CO3	Apply the clustering paradigms, hierarchical algorithms of data mining	K3
CO4	Analyze the data warehousing concepts	K4
CO5	Apply the OLAP and OLTP concepts	K3

UNIT I

Data Mining: Data – Data mining – Data mining functionalities – Interestingness Measures – Classification of data mining systems – Data mining task primitives.

UNIT II

Integration of Data mining system with a Data warehouse – Issues in data mining – Data preprocessing. **Association Rule mining and Classification:** Market basket analysis – Efficient and scalable frequent pattern mining methods - Multilevel and Multidimensional Association Rules.

UNIT III

Classification and Prediction - Bayesian Classification - Support Vector Machine - Associative Classification – Prediction. **Clustering and Trends in Data Mining:** Cluster Analysis - Types of Data in Clustering - Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical Methods - Density-Based Clustering - Grid-based Methods - Outlier Analysis - Data Mining Applications.

UNIT IV

Data Warehousing: Data Warehouse - Components of a Data Warehouse - Building a Data Warehouse - DBMS Schemas for Decision Support - Data Extraction, Clean up and Transformation Tools.

UNIT V

Business Analysis: The Importance of Tools - Taxonomy of Data Warehouse Tools - Online Analytical Processing (OLAP) and Online Transaction Processing (OLTP) - Multidimensional Data Modeling - OLAP Operations.

Text Book

S.No.	Author	Title of Book	Publisher	Year of Publication
1.	Varsha Bhosale	Data warehousing & Data Mining	Technical Publication	2019

Reference Books

1.	Pang-NingTan, Michael Steinbach and Vipin Kumar	Introduction to Data Mining.	Pearson Education	2016
2.	Max Barmer	Principles of Data Mining.	Springer	3 rd Edition,2016

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	M	M
CO3	S	S	M	S	S
CO4	M	M	S	S	M
CO5	S	S	M	M	S

S-Strong; M-Medium

SEMESTER - VI

Core Course - XVI	BCA	2019 - 2020
M19UCA16	MOBILE COMPUTING	
Credit: 4		

Objectives

Learn the basics of networking theory -networking concepts relevant to modern wireless systems emerging mobile computing ideas and best practices - Get hands-on knowledge practice with mobile computing and cloud services.

Course Outcomes

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

CO	Statement	Knowledge level
CO1	Remember the basic fundamentals of mobile computing	K1
CO2	Understand mobile computing through internet	K2
CO3	Remember Emerging technologies in mobile computing	K1
CO4	Understand about GPRS operations, Architecture to transfer of data	K2
CO5	Analyze the latest technologies like WiFi and CDMA	K4

UNIT I

Introduction:–Mobile Computing –Dialogue Control –Networks – Middleware and Gateways –Developing Mobile computer Applications –security in mobile computing. **Mobile Computing Architecture:** Architecture for Mobile computing –Three-tier architecture - Design considerations for mobile computing –Mobile computing through Internet.

UNIT II

Mobile Computing through telephony: Multiple access procedures – Satellite Communication Systems – Mobile computing through telephone – Developing an IVR Application – TAPI - Computer Supported Telecommunications Applications.

UNIT III

Emerging Technologies: Bluetooth –RFID –WiMAX –Java Card. **GSM:** Global System for mobile communications –GSM Architecture –GSM Entities – Call routing in GSM –GSM Addresses and Identifiers –Network Aspects in GSM.

UNIT IV

GPRS–GPRS and packet data network –GPRS network architecture – GPRS network operations –Data services in GPRS –MMS –GPRS Applications.

UNIT V

CDMA and 3G: Spread spectrum technology–CDMA vs. GSM –Wireless Data –Third generation networks –Applications on 3G.**Wireless LAN:** Wireless LAN advantages –IEEE 802.11 standards –Mobile in Wireless LAN –Deploying wireless LAN –Mobile Ad-hoc networks and sensor networks –WiFi vs. 3G.

Text Book

S No	Author	Title of Book	Publisher	Year of Publication
1.	Ashoke K Talukder, Roopa R Yavagal	Mobile Computing	Tata McGraw Hill, 2ndEdition	2010

Reference Books

1.	Uwe Hansmann, Lotharmerk, Martin S. Nicklous, Thomas Stober	Principles of Mobile Computing	Springer (India) Pvt Ltd, 2ndEdition	2012
2.	Sundara Rajan, Ramesh, Raja Sekaran	Mobile Computing	Sams Publishers, 1stEdition	2008

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	M	M
CO3	S	S	M	S	S
CO4	M	M	S	M	M
CO5	S	S	M	S	S

S-Strong; M-Medium

SEMESTER VI

Core Practical – VII	BCA	2019 - 2020
M19UCAP07	PRACTICAL VII - PYTHON PROGRAMMING	
Credit: 2		

Objectives

To understand the concepts of Python Programming

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic operators	K1
CO2	Understanding the Conditional Statements	K2
CO3	Applying the Lists & Functions	K3
CO4	Analyzing the Sorting	K4
CO5	Apply the Exception Handling	K3

1. Program using different types of operators.
2. Program to Perform the GCD of two numbers.
3. Program to implement Conditional Statements.
4. Program to implement PRIME number using looping statement.
5. Program to swap two numbers using function.
6. Program to find Factorial of a number using recursion.
7. Program to implement list and its operations.
8. Program to create an object using class.
9. Program to implement inheritance using class.
10. Program using Exception Handling.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	S	M	S	M
CO3	M	S	S	M	S
CO4	S	M	S	M	S
CO5	M	S	S	M	M

S- Strong; **M**-Medium

SEMESTER - VI

Core Practical - VIII	BCA	2019 - 2020
M19UCAPO8	PRACTICAL - VIII - DATA MINING USING	
Credit: 2	RAPID MINER	

Objectives

This lab provides the concept of data process and retrieval techniques. It covers the basic concepts such as the data analysis storage and filtering concepts when retrieve the exact data using various algorithms.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic concepts of Database storage	K1
CO2	Understand the concepts of information storage and retrieval	K2
CO3	Analyze how the Information can be stored and apply some algorithms when trying to retrieve the data	K4
CO4	Analyze algorithm for filtering data when it is fetched from data store	K4
CO5	Apply the concept of algorithm for eliminating unwanted data's	K3

1. Importing Data into Rapid miner.
2. Graphical Representation of Data.
3. Correlation and Dependency computation.
4. Type Conversion and Outlier Detection.
5. Applying Model for prediction.
6. Implementation of Bayesian model.
7. Representing data using decision tree.
8. Clustering using K-Means Algorithm.
9. Association rule process on dataset using apriori algorithm.
10. Text mining using Rapid miner.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	M	S	M	S
CO3	M	S	M	S	M
CO4	M	S	S	M	S
CO5	S	M	S	S	M

S- Strong; **M**-Medium

ALLIED SUBJECTS

SEMESTER - I

Allied - I	BCA	2019 - 2020
M19UMAA01	ALLIED-I - MATHEMATICS - I -	
Credit: 4	ALGEBRA, INTEGRAL CALCULUS AND FOURIER SERIES	

Objectives

This course introduces fundamental concepts of Basic Mathematics. It covers such as matrix, Eigen Values and Eigen Vectors, Cayley Hamilton theorem, Polynomial equations, Imaginary and irrational roots, Descartes' rule of signs, Radius of curvature in Cartesian and polar co-ordinates, Integral Calculus, Integration by Parts, Fourier Series, Half range series. It provides technical skills to understand the concepts in allied mathematics.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of matrix, Eigen Values and Eigen Vectors, Cayley Hamilton theorem.	K1
CO2	Understand the theory of equations and its properties.	K2
CO3	Demonstrate understanding of the importance of the radius of curvature.	K2
CO4	Develop the idea about the solution of Integral Calculus, Integration by Parts.	K2
CO5	Understanding the concept of Fourier Series, Half range series.	K3

Unit I

Definition of Matrix – Addition ,Subtraction , Multiplication of Matrices . Transpose of a Matrix – Adjoint of a Matrix – Inverse of the Matrix. Characteristic Equation – Eigen Values and Eigen Vectors – Cayley Hamilton Theorem (Statement only)

Unit II

Polynomial Equations – Imaginary and Irrational roots – Transformation of Equation – Descartes' rule of signs – Problems.

Unit III

Radius of Curvature in Cartesian and polar coordinates – Pedal Equation of a curve – Radius of curvature in Polar Coordinates.

Unit IV

Integral Calculus – Integration by Parts – Definite integrals and its properties – Reduction formula for $\int \cos^n x dx$, $\int \sin^n x dx$, $\int_0^{\frac{\pi}{2}} \sin^n x dx$, $\int_0^{\frac{\pi}{2}} \cos^n x dx$, $\int x^n e^{ax} dx$, $\int_0^{\infty} e^{-x} x^n dx$ Problems.

Unit V

Fourier Series – Definition – To find the Fourier coefficients of periodic functions of period 2π – even and odd functions – Half range series – problems.

Text Books

S.No	Author	Title of the Books	Publisher	Year of Publication
1.	T.K.Manicka vasagam Pillai and S.Narayanan	Algebra Volume-I	Vijay Nicole Imprints Pvt Ltd, # C-7 Nelson Chmbers. 115, Nelson Manicka m Road, Chennai – 600029.	2004
2.	Dr.P.R.Vittal	Algebra Calculus and Trigonometry	Margham Publications, 24, Rameswaram Road ,T.Nager, Chennai - 600017.	2000

Reference Books

1.	N.P. Bali	Calculus	Krishna Prakasan Mandhir, 9, Shivaji Road, Meerut (UP).	1994
2.	D. Sudha	Calculus	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1988

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	M
CO2	S	S	S	M	S
CO3	M	S	S	M	M
CO4	M	S	S	M	S
CO5	S	S	S	M	S

S- Strong; **M**-Medium

SEMESTER – II

Allied – II	BCA	2019 - 2020
M19UMAA02	ALLIED – II – MATHEMATICS – II –	
Credit: 4	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	

Objectives

This course introduces fundamental concepts of Basic Mathematics. It covers such as Second order differential equation with constant coefficient, Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions, Solutions of standard types of partial differential equations, Laplace transforms, Inverse Laplace transforms . It provides technical skills to understand the concepts in allied mathematics.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Acquiring knowledge of basic idea of Second order differential equation with constant coefficient and its problems.	K1
CO2	Understand the Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions.	K2
CO3	Demonstrate understanding of the importance of the Solutions of standard types of partial differential equations	K2
CO4	Develop the idea about the solution of the Laplace transforms and its problems.	K2
CO5	Understanding the concept of the inverse Laplace transforms and its problems.	K3

Unit I

Second order differential equation with constant coefficient - particular intergral of the type e^{ax} , $\cos ax$ or $\sin ax$, x^n , $e^{ax}V$ where V is any function of $\cos ax$ or $\sin ax$ or x or x^2 .

Unit II

Formation of partial differential equation by eliminating arbitrary constants and arbitrary functions – problems – definitions – complete, particular, singular and general integrals.

Unit III

Solutions of standard types of partial differential equations – Clairaut's form.

Unit IV

Laplace transforms – definitions – Standard formula – Elementary theorems – problems.

Unit V

Inverse Laplace transforms – Standard formula – Elementary theorems – problems.

Text Books

S.No	Author	Title of the Book	Publisher	Year of Publication
1.	Dr.P.R.Vittal	Differential Equations and Laplace Transforms	Margham Publications, Chennai -600017.	2002
2.	Dr.P.R.Vittal	Allied Mathematics	Margham Publications, 24, Rameswaram Road, T.Nager, Chennai -600017.	2002
3.	A.Singaravelu	Allied Mathematics	Meenakshi Publishers, 120, Pushpa Nagar, Medavakkam, Chennai – 601302.	2002

Reference Books

1.	Gunavathi & Thilkavathy	Engineering Mathematics	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1984
2.	N.P.Bali	Calculus	Krishna Prakasam Mandir, 9, Shivaji Road, Meerut (UP).	1994

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	M	M
CO2	S	S	S	M	S
CO3	M	S	S	M	M
CO4	M	S	S	M	S
CO5	S	S	S	M	S

S- Strong; **M**-Medium

SEMESTER – III

Allied - I	BCA	2019 - 2020
M19UCMA01	ALLIED-III - PRINCIPLES OF ACCOUNTANCY	
Credit: 4		

Objectives

Enable the students to apply the conceptual principles and to develop an expertise in handling the accounts of specialized institutions and the consolidation of accounts through appropriate accounting techniques and policies.

Course Outcomes

On the successful completion of the course students will be able to

CO	Statement	Knowledge Level
CO1	Familiarize the students with the steps involved in locating errors and make them understand the relationship between Profit & Loss A/c and Balance sheet.	K2
CO2	Group the accounting treatments relating to issue, acceptance, discounting, maturity and endorsement of bills and notes in the books of drawer and drawee	K2
CO3	Interpret and explain the performance of branches.	K3
CO4	Understand the concept of ex-interest, cum interest, to distinguish between bonus and rights and to examine the service potential of the fixed assets with the different methods of depreciation.	K3
CO5	Explain the procedures for depreciation and royalty to examine the due provision for strikes and lockouts.	K3

UNIT – I

Accounting - Definition –Advantages - Limitations- Accounting Rules- Classification of Accounts- Types of accounts - Accounting Concepts and Conventions

UNIT – II

Journal – Definition – Advantages - Ledger -Subsidiary books – Purchase Book-Sales Book- Return Books-Trial Balance-Advantages. (Simple problems)

UNIT – III

Final Accounts of a Sole Trader – Advantages- Trading Account- Profit & Loss Account-Balance Sheet-Adjustments. (Simple Problems)

UNIT – IV

Bank Reconciliation Statement - Definition –Advantages- Process. (Simple problems)

UNIT – V

Depreciation – Definition – Causes– Methods – Fixed – Diminishing – Annuity. (Simple Problems)

Text Book

S. No.	Author	Title of the Book	Publisher	Year of Publication
1.	T. S. Reddy & A. Murthy	Financial Accounting	Margham Publications, Chennai	2017

Reference Books

1.	S. P.Jain & K.L. Narang	Advanced Accounting	Kalyani Publishers, New Delhi	2018
2.	N. Vinayaraman, P.L. Mani	Principles of Accountancy	Sultan Chand & Sons, New Delhi	2010
3.	Grewal T.S., H.S. Grewal	Double Entry Book Keeping	Sultan Chand & Sons, New Delhi	2018

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	M	S	S
CO4	S	S	S	M	S
CO5	S	M	S	M	M

S - Strong; **M** - Medium

SEMESTER – III

Allied Practical - I	BCA	2019 - 2020
M19UCMAP01	ALLIED PRACTICAL - I -TALLY	
Credit : 2		

Objectives

This course provides the basic concepts of financial accounting to calculate the Profit & Loss of the company during the financial year and also making the bridges between manual accounting to automated system by using Tally ERP9 Accounting software, this course also cover recent taxation of GST, VAT, TCS and TDS.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Understand the basic principles and concepts of computerized accounting and Accounting Features.	K2
CO2	Apply the voucher entry problems and budget preparation of the concern	K3
CO3	Understand the calculations of TDS and TCS for the given problems of the firm	K2
CO4	Understand the step involved to calculate the VAT for stock items	K2
CO5	Apply to calculate the GST for goods and services of the concern	K3

- 1 Creation, alteration and deletion of company
- 2 Creation, alteration and deletion of primary and secondary accounting groups.
- 3 Voucher entry problems in double entry mode.
- 4 Voucher entry problems using stock items.
- 5 Generation of inventory books and reports.
- 6 Budget preparation and reporting variance
- 7 Prepare the TDS calculations with report.
- 8 Calculate the TCS with report generation.
- 9 Create the VAT for stock items.
- 10 Calculate the GST for goods and services.

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	M
CO2	S	S	M	M	S
CO3	M	M	S	S	M
CO4	S	S	M	S	M
CO5	S	M	S	M	S

S- Strong, M-Medium

SEMESTER - IV

Allied - II	BCA	2019 - 2020
M19UCMA02	ALLIED-IV - MODERN BANKING	
Credit: 4		

Objectives

Understand the legal procedures formulated under banking regulation act negotiable instrument act and other legal issues. Provide exposure to the students with the latest developments in the banking field Acquire specialized knowledge of law and practice relating to banking.

Course Outcomes

On the successful completion of the course students will be able to prepare and present regarding banking technologies used.

CO	Statement	Knowledge Level
CO1	Understand and explain the conceptual frame work of banking	K1,K3
CO2	Classify and demonstrate the types of crossed cheques, loans and advances	K2,K3
CO3	Illustrate the various electronic payment methods.	K2,K3

UNIT - I

Banking – Definition – Classification - Commercial Bank - Functions and Services.

UNIT - II

Reserve Bank of India – Origin – Functions – Role in Economic Development.

UNIT - III

E-Banking – Meaning – Traditional Banking Vs E-Banking – E-Banking – Services – Benefits – Mobile Banking features and services.

UNIT - IV

Internet Banking – Services – Major Issues – Drawbacks- Indian Scenario – Concept of ATM – ATM features – Mechanism – functions and strategic importance - CDM

UNIT – V

Recent development in Banking – RTGS – NEFT – IMPS

Text Books

S. No.	Author	Title of the Books	Publisher	Year of Publication
1.	P. N. Varshney	Banking Law and Practice	Sultan Chand & Sons	2017
2.	Prof. E. Gordon & Dr. K. Natarajan	Banking Theory, Law and Practice	Himalaya Publishing House, Mumbai	2018

Reference Books

1.	Dr. S. Sankaran	Money, Banking and International trade	Margham Publications	2002
2.	E. Gordon, Dr. K. Natarajan	Banking Theory and Practice	Himalaya Publishing house	2018
3.	Dr. D.M. Mithani	Money, banking and international trade	Himalaya Publishing House	2004
4.	K.P.M Sundaram& P. N. Varshney	Banking Theory and Practice	Sultan Chand & Sons	2015

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	M	S	S

S - Strong; **M** – Medium

SEMESTER - IV

Allied Practical - II	BCA	2019 - 2020
M19UCMAP02	ALLIED PRACTICAL - II - COMMERCE PRACTICAL	
Credit: 2		

Objectives

Help the students to gain knowledge on invoice, voucher, Entry pass, Debit note and Credit note and to enable the students to be proficient with filling LIC application, PAN form and IT form.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Identify the procedure for filling up of receipts, voucher and delivery challan	K1
CO2	Understand the concepts drawing and endorsing of cheques.	K2
CO3	Identify the procedure for filling up of loan application	K1
CO4	Develop the model of cost sheet and agenda	K3
CO5	Develop the concept of preparation of advertising copy.	K3

1. Preparation of Invoice
2. Preparation of Receipt
3. Preparation of Voucher
4. Preparation of Delivery Challan
5. Preparation of Entry Pass
6. Preparation of Gate Pass
7. Savings Bank Account Opening Form
8. Current Account Opening Form
9. Fixed Deposit Application
10. Drawing of Cheque
11. Crossing of Cheque
12. Pay in Slip
13. Demand Draft Application
14. Demand Draft
15. Application Form for admission to Co-operative Societies
16. Deposit Challan
17. Jewel Loan Application Form

18. Jewel Loan Receipt
19. Share Application Form
20. Preparation of Agenda
21. Minutes of General Body Meeting
22. Minutes of Board Meeting
23. LIC Application Form
24. LIC premium payment Challan
25. PAN Card Application
26. Collection of Advertisement Copy

NOTE:

Students may be requested to collect original or Xerox copied of the documents and affix then on the record note book after having filled up.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	M	S	S
CO4	S	S	S	M	S
CO5	S	M	S	M	M

S- Strong; **M-**Medium

ELECTIVE SUBJECTS

SEMESTER V

Elective - I	BCA	2019 - 2020
M19UCAE01	COMPILER DESIGN	
Credit: 4		

Objectives

This course introduces the basic principle concepts in compiler design analysis of source program, role of parser top down and bottom up parsing, intermediate languages, code generator representation of basic blocks, principles of optimization.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Understand the compiler design analysis of source program	K2
CO2	Analyze the role of parser top down and Bottom up parsing	K4
CO3	Understand the intermediate languages	K2
CO4	Understand the concepts of code generator representation of basic blocks	K2
CO5	Apply the concepts of principles of optimization	K3

UNIT I

Compilers: Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools - Lexical Analysis - Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT II

Role of the parser:–Writing Grammars –Context-Free Grammars – Top Down parsing Recursive Descent Parsing - Predictive Parsing – Bottom-up parsing - Shift Reduce Parsing – Operator Precedent Parsing.

UNIT III

Intermediate languages: – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

UNIT IV

Issues in the design of code generator: – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

UNIT V

Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Alfred Aho, Ravi Sethi, Jeffrey D Ullman	Compiler principles, techniques and tools	Pearson education Asia	2010

Reference Books

1.	Allen I. Holub	Compiler Design in C	Prentice hall of India	2009
2.	Fischer.C.N and LeBlanc.R.J	Crafting a compiler with C	Prentice hall of India	2009
3.	Bennet.J.P	Introduction to Compiler Techniques	Tata MC Graw-Hill	2008

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	M
CO2	S	S	M	S	M
CO3	M	M	S	M	S
CO4	S	S	M	S	M
CO5	S	M	S	S	S

S- Strong; **M**-Medium

SEMESTER V

Elective - I	BCA	2019 - 2020
M19UCAE02	SOFT COMPUTING	
Credit: 4		

Objectives

This course covers the concepts of neural networks and the role of neural networks in intelligent systems. It also presents fuzzy set theory, fuzzy logic, genetic algorithm, and hybrid system.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Understand the fundamental of neural networks and their applications	K2
CO2	Analyze adaptive Resonance Theory	K4
CO3	Apply on Fuzzy Set Theory and systems	K3
CO4	Analyze Genetic Algorithms and applications	K4
CO5	Apply the Neural Network , Fuzzy Logic, Genetic Algorithm Weight Determination	K3

UNIT I

Neural Networks: Fundamentals of Neural Networks – Basic Concepts of Neural Networks – Model of an Artificial Neuron – Neural Network Architecture – Characteristics of Neural Network – Learning Methods – Taxonomy of Neural Network Architecture – Back Propagation Network – Architecture of Back Propagation Network – Back Propagation Learning

UNIT II

Neural Network Associative Memory: Auto Correlations – Hetero Correlations – Exponential BAM – Associative Memory for Real Coded Pattern Pairs – Adaptive Resonance Theory – Introduction – ART1 – ART 2 – Applications

UNIT III

Fuzzy Set Theory: Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations – Fuzzy Systems: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule Based System – Defuzzification Method – Applications

UNIT IV

Genetic Algorithms: History – Basic Concepts – Creation of off Springs – Working Principle –Encoding – Fitness Function – Reproduction .Genetic Modeling – Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator –Applications – Advances in Genetic Algorithm

UNIT V

Hybrid System: Integration of Neural Network – Fuzzy Logic – Genetic Algorithm-Hybrid System – Neural Network – Fuzzy Logic – Genetic Algorithm Weight Determination – Application – Fuzzy Back Propagation Network – Language Recognition Type Fuzzy Members – Fuzzy Neuron – Fuzzy Back Propagation Architecture – Learning in Fuzzy Back Propagation – Applications – Knowledge Base Evaluation

Text Book

S. No.	Author	Title of the Book	Publisher	Year of Publication
1.	S.Rajasekaran, G.A.Vijayalakshmi Pai	Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Application	Prentice Hall of India,Pvt. Ltd	2011

Reference Books

1.	Haykin Simon	Neural Networks and Learning Machines	Prentice Hall of India	3 rd Edition 2011
2.	Vinoth Kumar , R. Saravana Kumar	Neural Network and Fuzzy logic	S.K. Katria & Sons	2012
3.	Tang, Tan , Yi	Neural Networks: Computational Models and Application	Springer Verlag Publications	2010

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	M	M	S	S
CO3	M	S	M	S	M
CO4	S	M	S	M	S
CO5	S	M	S	M	M

S - Strong; **M** - Medium

SEMESTER V

Elective- I	BCA	2019 - 2020
M19UCAE03	SOFTWARE TESTING	
Credit: 4		

Objectives

This course provides the foundation techniques, and tools in the area of software testing. This course also includes various methodologies of different software testing techniques and their challenges for a real time project.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the verification and validation techniques	K1
CO2	Understand different types of testing and their objectives	K2
CO3	Understand system and acceptance testing	K2
CO4	Apply software testing methods and its objectives and challenges	K3
CO5	Analyze the software products to execute and report test cases	K4

UNIT I

Software Development Life Cycle Models: Phases of Software project – Quality, Quality Assurance, and Quality control – Testing, Verification and Validation – Process Model to represent Different Phases - Life Cycle models. White-Box Testing: Static Testing – Structural Testing – Challenges in White-Box Testing.

UNIT II

Black-Box Testing: What is Black-Box Testing? - Why Black-Box Testing? – When to do Black- Box Testing? – How to do Black-Box Testing? Integration Testing: Integration Testing as Type of Testing – Integration Testing as a Phase of Testing – Scenario Testing - Defect Bash

UNIT III

System And Acceptance Testing: System Testing Overview – Why is System testing done? – Functional versus Non-functional Testing - Functional System Testing - Non-Functional Testing – Acceptance Testing - Summary of Testing Phases

UNIT IV

Performance Testing: Factors Governing Performance Testing – Methodology for Performance Testing - Tools for Performance Testing - Process for Performance Testing - Challenges. Regression Testing: What is Regression Testing? – Types of Regression Testing – When to do Regression Testing? – How to do Regression Testing? – Best Practices in Regression Testing

UNIT V

Test Planning, Management, Execution And Reporting: Test Planning – Test Management Test Process – Test Reporting. Quick Test Professional (QTP): Overview of QTP – Testing an Application using QTP – Creating Check Points – Testing Database Application – Testing a Web Application

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Srinivasan Desikan, Gopaldaswamy Ramesh	Software Testing Principles and Practices	Pearson Education	2012

Reference Books

1.	Dr.K.V.K.K.Prasad	Software Testing Tools	Dreamtech Press	2012
2.	Renu Rajani	Testing Practitioner Handbook	Packt Publishing Limited	2017
3.	Naresh Chauhan	Software Testing	Oxford University Press	2 nd edition, 2016

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
C01	S	S	S	S	S
C02	M	S	M	S	M
C03	S	M	S	M	S
C04	S	S	M	S	M
C05	M	M	S	M	S

S- Strong; M-Medium

SEMESTER V

Elective- I	BCA	2019 - 2020
M19UCAE04	RUBY ON RAILS	
Credit: 4		

Objectives

This course introduces the basic knowledge of HTML with Ruby programming. It covers concept such as arrays, variables, debugging, forms and cookies. It provides technical skills to design and develop various applications and understanding the ruby programming.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember about the basics of Ruby and arrays and variables.	K1
CO2	Understand the role of first step with rails and debugging.	K2
CO3	Analyze and Understand the databases.	K3
CO4	Analyze the concepts of Scaffolding and rest.	K4
CO5	Apply the concepts of Forms and cookies in various applications.	K3

UNIT I

Ruby Introduction: Basics – Hello world – puts and print – comments – Ruby is Object –Oriented – Methods – Classes – Basic Classes – Strings – Numbers- Boolean values – Variables – Naming conventions- scope of variables – Methods once again – Method Chaining- Getters and Setters.

UNIT II

Conditions: if conditions – shorthand – else –else if – loops: While and until – Blocks and Iterations – Arrays and Hashes: Arrays – hashes – Range. First steps with Rails: Static contents(HTML and Graphics Files) – Create a Rails project – Static pages- Creating HTML Dynamically with erb – Layouts – Passing instance variables from a controller to a view- The Rails Console: app- What is Generator?- Debugging.

UNIT III

Active Record: Creating a database/Model – Adding Records: Create – new. Populating the Database with seeds.rb – Searching and Finding with queries – Calculations – Batches – Editing a Record – Polymorphic associations – Deleting/Destroying a record – Transaction – Scopes – Validation – Migration.

UNIT IV

Scaffolding and REST: Redirects and Flash Messages: Redirect – Flash Messages – Different types of flash Messages. Generating a Scaffold: The Routes – The Controller – The Views. Routes: HTTP GET Request for singular resources – Resources. Bundler and Gems: Bundle Update – Bundle outdated- Popular Gems.

UNIT V

Forms: The Data Input Workflow- Generic Forms – FormTagHelper. Cookies and Sessions: Cookies – Permanent cookies – Signed cookies – Sessions. Tests: Example for a user in a web shop – Fixtures – Integration Test – Rails Stats.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Stefan Windermeyer	Learn Rails 5.2	Apress	2018

Reference Book

1.	Barry Burd	Ruby on Rails for Dummies	Wiley	2007
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	M
CO3	M	S	S	S	S
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S- Strong; **M-**Medium

SEMESTER VI

Elective - II	BCA	2019 - 2020
M19UCAE05	CYBER SECURITY	
Credit: 4		

Objectives

This course provides students basic knowledge and skills in the fundamental theories and practices of Cyber Security. This course will provide a basic introduction to of all aspects of cyber-security including business, policy and procedures, communications security, network security, security management, legal issues, political issues, and technical issues.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember broad set of technical, social & political aspects of Cyber Security.	K1
CO2	Understand the risks in software and hardware	K2
CO3	Analyze the cyber security and building a secure organization	K4
CO4	Analyze the cyberspace privacy in web	K4
CO5	Apply the Cyber Warfare and Homeland Security in cyber law.	K3

Unit- I

Introduction to Cyber Security: Introduction - Computer Security - Threats - Harm - Vulnerabilities - Controls. Toolbox: Authentication, Access Control and Cryptography: Authentication - Access Control - Cryptography. The Web-User Side: Browser Attacks - Web Attacks Targeting Users - Email Attacks.

Unit -II

Risks in Information Systems Infrastructure: Introduction - Risks in Hardware - Risks in Software - Risks in People - Risks in Laptops - Risks in Cyberspace - Risk Insurance in Cyberspace. **Secure Information Systems:** Assets Identification - Assets Communication - Assets Storage - Resource Access Control Facility - Securing the Email Communications - Information Security Management.

Unit –III

Cyber Security and the CIO: Introduction - CIO: Personality - CIO: Education - CIO: Experience - CIO: Responsibilities - CIO: Information Security - CIO: The Changing Role - **Building a Secure Organization:** Introduction - Business Continuity Planning - System Access Control - System Development and Maintenance - Physical and Environmental Security - Compliance - Personnel Security - Security Organization - Computer and Network Management - Asset Classification and Control - Security Policy.

Unit- IV

Privacy in Cyberspace: Privacy Concepts - Privacy Principles and Policies - Authentication and Privacy - Data Mining - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.

Unit V

Cyberspace and the Law: Introduction - International Laws - Cyber-Related Laws - Cybercrime - **Cyber Warfare and Homeland Security:** Cyber Warfare - Homeland Security - Cyber Security Preparedness - Distributed Defense.

Text Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1.	Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies	Security in Computing	Pearson Education	2015
2.	George K.Kostopoulous	Cyber Space and Cyber Security	CRC Press	2013

Reference Book

1.	Martti Lehto, Pekka Neittaanmäki	Cyber Security: Analytics, Technology and Automation	Springer International Publishing, Switzerland	2015
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	S
CO2	S	M	M	S	M
CO3	M	S	M	S	S
CO4	S	S	S	M	M
CO5	M	M	S	M	S

S- Strong; **M**-Medium

SEMESTER VI

Elective – II	BCA	2019 - 2020
M19UCAE06	CLOUD COMPUTING	
Credit: 4		

Objectives

This course provides students basic knowledge and skills in the fundamental of accessing the cloud applications. This course will provide a basic introduction to cloud computing services, benefits, limitations and security concerns.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Identify the application services, benefits and security concerns	K1
CO2	Understand the hardware and infrastructure, cloud storage and standards	K2
CO3	Analyze the service, best practices and migration	K4
CO4	Develop applications, troubleshooting and application management	K3
CO5	Apply the web applications, web APIs and web browsers	K3

Unit - I

Cloud Computing Basics: Cloud Computing Overview - Applications - Intranets and the Cloud - First Movers in the Cloud. **Your Organization and Cloud Computing:** When You Can Use Cloud Computing - Benefits - Limitations - Security Concerns - Regulatory Issues.

Unit - II

Cloud Computing with the Titans: Google - EMC- NetApp - Microsoft - Amazon - Salesforce.com – IBM - Partnerships. **The Business Case for Going to the Cloud:** Cloud Computing Services - How Those Applications Help Your Business- Deleting Your Datacenter- Salesforce.com - Thomson Reuters.

Unit – III

Hardware and Infrastructure: Clients - Security - Network - Services. **Accessing the Cloud:** Platforms - Web Applications - Web APIs - Web Browsers. **Cloud Storage:** Overview - Cloud Storage Providers. **Standards:** Application – Client – Infrastructure - Service.

Unit - IV

Software as a Service: Overview - Driving Forces - Company Offerings – Industries. **Software plus Services:** Overview - Mobile Device Integration - Providers - Microsoft Online. **Developing Applications:** Google – Microsoft - Intuit QuickBase - Cast Iron Cloud - Bungee Connect – Development – Troubleshooting - Application Management.

Unit - V

Migrating to the Cloud: Cloud Services for Individuals - Cloud Services Aimed at the Mid-Market - Enterprise-Class Cloud Offerings – Migration. **Best Practices and the Future of Cloud Computing:** Analyze Your Service - Best Practices - How Cloud Computing Might Evolve.

Text Book

S. No.	Author	Title of the Book	Publishing Company	Year of Publication
1.	Toby Velte, Anthony Velte, Robert C. Elsenpeter	Cloud Computing, A Practical Approach	Tata McGraw-Hill Edition	2010

Reference Books

1.	Thomas Erl, Zaigham Mahood, Ricardo Puttini	Cloud Computing, Concept, Technology and Architecture	Prentice Hall	2013
2.	John Rittinghouse and James Ransome	Cloud Computing, Implementation, Management and Strategy	CRC Press	2010

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	M	S	S
CO4	S	S	S	M	S
CO5	S	M	S	M	M

S- Strong; **M**-Medium

SEMESTER VI

Elective - II	BCA	2019 - 2020
M19UCAE07	BIG DATA ANALYTICS	
Credit: 4		

Objectives

It also provide detailed information about hadoop, map reduce, spark and SQL database.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember characteristics of Big data concepts	K1
CO2	Analyze the data with Hadoop	K4
CO3	Understanding Map Reduce Applications	K2
CO4	Understand the Spark concepts	K2
CO5	Apply the Databases like No SQL	K3

Unit I

Introduction to big data: Introduction – Big Data- Characteristics of Big Data – Big data management architecture- Examining Big Data Types – Big Data Technology Components - Big data analytics – Big data analytics examples - Web Data Overview – Web Data in Action.

Unit II

Hadoop: Introduction – History of Hadoop - Hadoop Ecosystem- Analyzing data with Hadoop - Hadoop Distributed File System- Design - HDFS concepts - Hadoop file system – Data flow – Hadoop I / O - Data integrity – Serialization - Setting up a Hadoop cluster - Cluster specification - cluster setup and installation – YARN.

Unit III

Map Reduce: Introduction – Understanding Map, Reduce functions - Scaling out - Anatomy of a Map Reduce Job Run - Failures – Shuffle and sort – Map reduce types and formats - features – counters - sorting – Map reduce Applications – Configuring and setting the environment - Unit test with MR unit - local test.

Unit IV

Spark: Installing spark – Spark applications, Jobs, Stages and Tasks – Resilient Distributed databases - Anatomy of a Spark Job Run – Spark on YARN- SCALA: Introduction- Classes and objects - Basic types and operators - built-in control structures - functions and closures - inheritance.

Unit V

No SQL Databases: Introduction to NoSQL - MongoDB: Introduction – Data types – Creating, Updating and deleting documents - Querying – Introduction to indexing – Capped collections. Hbase: Concepts - Hbase Vs RDBMS - Creating records- Accessing data – Updating and deleting data – Modifying data - exporting and importing data. USE CASES: Call detail log analysis, Credit fraud alert, Weather forecast.

Text Books

S. No.	Author	Title of the Book	Publishing Company	Year of Publication
1.	Bill Franks	Taming the Big Data Tidal wave	John Wiley & Sons	2012
2.	Tom White	Hadoop : The Definitive Guide	O'Reilly Media	2012
3.	Martin Odersky, Lex Spoon, Bill Venners	Programming in Scala	Artima Press, California	2010

Reference Books

1.	Boris lublinsky, Kevin t. Smith, Alexey , Yakubovich	Professional Hadoop Solutions	Wiley	2015
2.	Chris Eaton, Dirk deroos et al.	Understanding Big data	McGraw Hill	2012

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	M	S	M
CO3	M	S	M	S	S
CO4	S	S	S	M	M
CO5	S	M	S	M	M

S- Strong; **M**-Medium

SEMESTER VI

Elective - II	BCA	2019 - 2020
M19UCAE08	DISTRIBUTED COMPUTING	
Credit: 4		

Objectives

This course provides students basic knowledge and skills on the System Models, Networking and Internetworking, Remote Invocation.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the characteristics of distributed systems	K1
CO2	Understand the networking and interprocess communication	K2
CO3	Analyze peer to peer in distributed system.	K4
CO4	Apply the transaction and concurrency control.	K3
CO5	Apply distributed multimedia systems and transactions	K3

Unit - I

Characterization of Distributed Systems: Introduction – Examples of Distributed Systems – Trends in Distributed Systems – Focus on Resource Sharing - Challenges - Case Study: The World Wide Web. **System Models:** Introduction – Physical Models – Architectural Models – Fundamental Models.

Unit - II

Networking and Internetworking: Introduction – Types of Network – Network Principles - Internet Protocols – Case Studies: Ethernet, WiFi and Bluetooth. **Inter process Communication:** Introduction – The API for the Internet Protocols – External Data Representation and Marshalling – Multicast Communication - Network Virtualization: Overlay Networks - Case Study: MPI.

Unit – III

Remote Invocation: Introduction – Napster and its legacy - Remote Procedure Call - Remote Method Invocation - Case Study: Java RMI. **Indirect**

Communication: Introduction - Group Communication – Publish-subscribe Systems – Message Queues- Shared Memory Approaches.

Peer-to-Peer Systems: Introduction – Napster and its Legacy - Peer-to-Peer Middleware - Routing Overlays - Overlay Case Studies: Pastry, Tapestry.

Unit - IV

Distributed File Systems: Introduction - File Service Architecture - Case Study: SUN Network File System - Case Study: The Andrew File System - Enhancements and Further Developments. **Times and Global States:** Introduction - Clocks, Events and Process States - Synchronizing Physical Clocks - Logical Time and Logical Clocks - Global States - Distributed Debugging. **Transaction and Concurrency Control:** Introduction - Transactions - Nested Transaction - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison of Methods for Concurrency Control.

Unit - V

Distributed Transactions: Introduction - Flat and Nested Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery. **Distributed Multimedia Systems:** Introduction - Characteristics of Multimedia Data - Quality of Service Management - Resource Management - Stream Adaptation - Case Studies: Tiger, BitTorrent and End System Multicast.

Text Book

S. No.	Author	Title of the Book	Publisher	Year of Publication
1.	George Coulouris, Jean Dollimore and Tim Kindberg	Distributed Systems Concepts and Design	Pearson Education	2012

Reference Books

1.	Liu M.L.	Distributed Computing, Principles and Applications	Pearson Education	2004
2.	Ajay D. Kshemkalyani, Mukesh Singhal	Distributed Computing Principles, Algorithms, and Systems	Cambridge University Press	2008

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	S
CO2	S	M	M	S	S
CO3	M	S	M	S	S
CO4	S	S	S	M	S
CO5	S	M	S	M	M

S- Strong; **M**-Medium

SKILL ENHANCEMENT COURSES

SEMESTER III

SEC - I	BCA	2019 - 2020
M19UCAS01	SEC I - MS-OFFICE	
Credit: 2		

Objectives

This course covers the concepts of Ms-word, Excel, Power point and Access

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Understand the fundamental of Ms-Office	K2
CO2	Remember the basics in Ms-Word	K1
CO3	Apply the functions and formulas in Ms-Excel	K3
CO4	Understand the working of Presentation	K2
CO5	Apply Ms-Access to create database	K3

UNIT-I

Getting started: Starting a Program – Identifying Common Screen Elements – Choosing Commands – Finding Common Ways to Work – Getting Help with office.

UNIT-II

MS-WORD: Learning Word Basics – Formatting a Word Document – Improving Your Writing –Working with Longer Document.

UNIT- III

MS-EXCEL: Creating a simple Spreadsheet – Editing a Spreadsheet – Working with functions and formula – Formatting Worksheets – Completing Your Spreadsheet – Creating Charts

UNIT-IV

MS-POWERPOINT: Creating and Viewing Presentation – Editing a Presentation – Working with Presentation Special Effects.

UNIT- V

MS- ACCESS: Creating an Access Database -Understanding Database Terms-Using the Database Wizard -Working with Records Printing Database Reports- **Modifying an Access Database:** Modifying Table Structure- Modifying Table Structure.

Text Book

S. No.	Title of the Book	Author	Publisher	Year of Publication
1.	Diane Koers	Microsoft Office XP – fast and easy	Prentice Hall of India,Pvt. Ltd	2011

Reference Books

1.	R K Taxali	PC Software for Windows	Tata McGraw Hill	2007
2.	Alan Neibauer	Office The Basics & Beyond	Tata McGraw Hill	2008

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	M	M	S	S
CO3	M	S	M	S	M
CO4	S	M	S	M	S
CO5	S	M	S	M	M

S - Strong; **M** - Medium

SEMESTER IV

SEC - II	BCA	2019 - 2020
M19UCAS02	SEC - II - SHELL PROGRAMMING	
Credit: 2		

Objectives

This course introduces the basic commands and I/O Redirection, tools of the trade, quotes and passing arguments, concepts of decision status, reading and writing data.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember about the basic commands and I/O Redirection	K1
CO2	Understand the tools of the trade	K2
CO3	Understand the quotes and passing arguments	K2
CO4	Analyze the concepts of decision status	K4
CO5	Apply the concepts of reading and writing data	K3

UNIT I

A Quick review of the Basics: Some Basic Commands – Working with Files – Working with Directories – Filename Substitution – Standard I/O and I/O Redirection – Pipes – Standard Error – More on Commands. **What is the Shell?** : The Kernel and the Utilities – The Login Shell – Typing Commands to the Shell – The Shell's Responsibilities.

UNIT II

Tools of the Trade: Regular Expressions – Cut – Paste – sed – TR – grep – sort – uniq – Variables.

UNIT III

The Single Quote – The Double Quote – The Backslash – Command Substitution. **Passing Arguments:** The \$# Variables – The \$* Variable – Program to Look up, Add, Remove from Phone Book – The shift Command.

UNIT IV

Decisions : Exit Status – The test Command – The else Construct – The exit Command – The Elif Construct – The case command – The Null Command – The && and || Constructs.

UNIT V

The for Command – The until command. **Reading and Printing Data:** The Read Command – The printf Command.

Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Stephen g. Kochan, patrick wood	UnixShell Programming	Pearson Education	3rd Edition, 2011

Reference Book

1.	Yashwanth Kanetkar	Unix Shell Programming	BPB Publications	1st Edition Reprint 2012
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	S	M	S
CO2	S	S	M	M	S
CO3	M	M	S	S	M
CO4	S	S	M	M	S
CO5	M	M	S	S	M

S- Strong; **M-**Medium

SEMESTER V

SEC - III	BCA	2019 - 2020
M19UCAS03	SEC – III – OPEN SOURCE TECHNOLOGY	
Credit: 2		

Objectives

This course provides the basic idea about the open source concepts in PHP. This will help the students to gain the in depth knowledge about the basic concepts in PHP and built-in functions.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic concepts of PHP and control statements	K1
CO2	Understand function parameters and Strings	K2
CO3	Apply the string manipulation function	K3
CO4	Analyze the applications with mathematical functions	K4
CO5	Apply the file concepts in PHP	K5

UNIT-I

Basics of PHP: History of php-Language basics:-Lexical structure-Data types-variables-Expressions and Operators-flow. **Control statements:** if, if-else, while, do-while, switch, for, for each. **Functions:** Defining functions-Variable scope (global and local variables).

UNIT-II

Function parameters: call by reference-call by value-return values: return single value, multiple value-handling missing parameters-default parameters. **String:** String constants-printing string functions: print, print_r, printf, echo, var_dump.

UNIT-III

String Manipulation Functions: trim, ltrim, rtrim, strtolower, strtoupper, ucfirst, ucwords, strpos, substr,chartocode, strlen, strrev,str_word_count, strcmp, strcasecmp. **Array:** Indexed – Associative-multidimensional arrays-Array. Sorting:sort, asort, ksort, rsort, arsort, krsort, usort, uasort, uksort, ord functions.

UNIT-IV

OOPS in PHP: Class, Object, Inheritance, Creating a class-creating object-accessing properties and methods-this variable –inheritance-use of extend keyword-constructor. **Built in Functions in PHP: Mathematical functions:** floor, fmod, pow, round, rand, sqrt, max, min, log, hexdec.

UNIT-V

Date and Time Functions: data, data_default_timezone_set, strtotime, mktime. **Handling Files:** create- fopen - fread - fwrite – include – fclose – unlink – fgets – fgetc – feof - require-require_once.

Text Book

S. No.	Author	Title of the Book	Publisher	Year of Publication
1.	Steven Holzner	The Complete Reference PHP	Tata McGraw Hill Pvt.Ltd	2008

Reference Book

1.	Leon Atkinson	Core PHP programming	Pearson Education	2004
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Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	M	S	M	S
CO3	M	S	M	S	S
CO4	M	S	S	M	S
CO5	S	M	S	S	M

S- Strong; **M-**Medium

SEMESTER VI

SEC – IV	BCA	2019 - 2020
M19UCAS04	SEC – IV – PERL PROGRAMMING	
Credit: 2		

Objectives

To provide an understanding of application of Perl programming in general as well as in biological problem solving in addition to the basic Perl working environment.

Course Outcomes

CO	Statement	Knowledge level
CO1	Understand the basic Perl –control structures, subroutines and modules	K1
CO2	Understand the thorough understanding of protein structure in detail	K2
CO3	Analyze the students to get aware of Perl modules.	K3
CO4	Apply and solve Perl regular expressions using Perl language	K3
CO5	Apply about the Control structures of Perl Programming	K1

UNIT I

Introduction to Perl: Scalars: Introduction -Learning Perl: A Functional Approach -Constructing atgc.pl -The tr /// Function -Text Formatting - Formatting Numerical Output with printf.

UNIT II

Introduction to Perl: Arrays Introduction -jobs.pl -The split Function - The for each Loop Using Standard Perl Modules: Introduction to Perl Modules - The Getopt::Long Module -The LWP::Simple Module-Capturing Data with Regular Expressions.

UNIT III

Perl regular expressions: Regular expression –special character (+) - special character (*) special character (?)Special character (|)-multiline regexs: The s Option. **The Perl Debugger:** Debugging Perl Code-The Perl Debugger –The \$#array Variable.

UNIT IV

Perl Regular Expressions -II: Introduction –a summary of regex operation –pattern modifier operators –conditional matching operators –special characters –using the range of operators to exclude the alternatives.

UNIT V

Perl control statements: Perl control structures –syntax and operation of if statements –if statements –if_else statements –if_else if statement –if_elseif_else –unless modifier –the while loop –the until loop –the for loop –the for each loop.

Text Book

S. No.	Author	Title of Book	Publisher	Year of Publication
1.	Harshawardhan P Bal	Perl Programming for Bioinformatics	Tata McGraw Hill publication	2003

Reference Books

1.	James Tisdall	Beginning Perl for Bioinformatics	O'Reilly	2014
2.	James Tisdall	Mastering Perl for Bioinformatics	O'Reilly	2010
3.	James Lee	Beginning Perl	Apress	2004

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	M	S	S	S
CO3	S	M	M	S	M
CO4	S	M	S	M	S
CO5	S	S	M	S	M

S-Strong; M-Medium

**ENHANCEMENT COMPULSORY
COURSES**

SEMESTER I

ECC-I	BCA	2019 - 2020
M19UVE01	VALUE EDUCATION - YOGA	
Credit: 2		

Objectives

This paper provides the basic physical body and health concepts. This course has the basic Knowledge on Simplified Physical Exercises and Asanas and Meditation. It also helps to Introspect and improve the behaviors.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic idea about yoga	K1
CO2	Understand the Physical Exercises	K2
CO3	Analyze the body and mind	K4
CO4	Analyze the health concepts	K4
CO5	Apply the mind with yoga concepts	K3

பாடநோக்கம்

இளம் வயது முதல், உடல், மனம் இரண்டையும் பக்குவமாக வைத்துக் கொள்ளவேண்டியதன் அவசியத்தை மாணவர்களுக்கு உணரச் செய்தல்.

அலகு 1

யோகமும் உடல்நலமும் உடலமைப்பு - எளியமுறை உடற்பயிற்சி - மகராசனம் - யோகாசனங்கள்

அலகு 2

இளமைகாத்தல் - பாலுணர்வும் ஆன்மீகமும் - மனதின் 10 படிநிலைகள் - மனஅலைச்சுழல்.

அலகு 3

குணநலப்பேறு வாழ்வின் நோக்கம் - எண்மை ஆராய்தல் - ஆசை சீரமைத்தல் - சினம் தவிர்த்தல்.

அலகு 4

கவலை ஒழித்தல் - வாழ்த்தும் பயனும் - நட்பு நலம் - தனிமனித அமைதி.

அலகு 5

செயல்விளைவுத் தத்துவம் - மனத்தூய்மை, வினைத்தூய்மை - அன்பும் கருணையும் - பண்பாட்டுக் கல்வி.

Text Book				
S.No.	Author	Title of Book	Publisher	Year of Publication
1.	மனவளக்கலை யோகா	மனவளக்கலை யோகா	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
Reference Books				
1.		மனவளக்கலை யோகா -I	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
2.		மனவளக்கலை யோகா -II	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
3.		மனவளக்கலை யோகா -III	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
4.		எளிமுறை உடற்பயிற்சி	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	M	S	M	S
CO3	M	S	M	S	M
CO4	M	S	S	M	S
CO5	S	M	S	S	M

S- Strong; **M-**Medium

SEMESTER - II

ECC-II	BCA	2019 - 2020
M19UES01	ENVIRONMENTAL STUDIES	
Credit: 2		

Objectives

This course provides the basic idea about our environment, ecosystem, natural resources, pollution and environment policies and practices.

Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic fundamentals of our environment	K1
CO2	Understand our natural resources	K2
CO3	Remember the concept of food chain and Bio diversity	K1
CO4	Understand the Environmental pollution	K2
CO5	Analyze how the environment affects the human health.	K4

Unit – I – Fundamentals

Environment – Definition, Scope, Structure and Function of Ecosystems– Producers, Consumer and Decomposers – Energy Flow in the Ecosystem –Ecological Succession – Food Chain, Food Webs and Ecological Pyramids –Concept of Sustainable Development.

Unit – II – Natural Resources

Renewable Resources – Air, Water, Soil, Land and Wildlife resources, on-Renewable Resources, Coal, Oil and Natural Gas, Environment problems related to the extraction and use of Natural Resources.

Unit – III – Biodiversity

Biodiversity – Definition – Values – Consumption use, Production Social, Ethical, Aesthetic and Option Values Threats to Biodiversity – Hotspots of Biodiversity – Conservation of Biodiversity: In-situ, Ex-situ, Bio-Wealth National and Global Level.

Unit – IV – Environmental Pollution

Definition – Causes, Effects and Mitigation Measures – Air, Water, and Soil Pollution, Noise Pollution, Thermal pollution, Nuclear Hazards, Solid Wastes, Acid Rain, Climate change and Global Warming, Environmental Laws and Regulations in India – Earth summit.

Unit – V – Pollution and Environment

Population Explosion – Environment and Human Health – HIV/AIDS – Women and Child Welfare – Resettlement and rehabilitation of people, Role of Information Technology in Environmental Health – Environment Awareness, Environmental Awareness, Environment Disaster Management – Fire Safety and Prevention.

Reference Books

S No	Author	Title of Book	Publisher	Year of Publication
1.	Gadgil, M., & Guha	This Fissured Land: An Ecological History of India	Univ. of California Press	1993
2	Gleeson, B. and Low, N	Global Ethics and Environmen	London, Routledge	1999

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	S	M	S	M
CO2	S	M	S	M	S
CO3	M	S	M	S	M
CO4	M	S	S	M	S
CO5	S	M	S	S	M

S- Strong; **M-**Medium