



MAHENDRA ARTS & SCIENCE COLLEGE (Autonomous)

Affiliated to Periyar University, Salem.

Accredited by NAAC with 'A' Grade & Recognized u/s 2(f) and 12(B) of the UGC Act 1956
Kalippatti – 637 501, Namakkal (Dt), Tamil Nadu.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Number of Courses Focusing on Employability/ Entrepreneurship/ Skill Development

Programme : BCA

S.No.	Year	Total No. of Courses	Employability (1)	Entrepreneurship (2)	Skill development (3)	Total No. of Courses (1+2+3)
1	2020-2021	33	8	-	9	17
2	2019-2020	49	18	-	13	31
3	2018-2019	51	17	-	13	30
4	2017-2018	34	8	-	7	15
5	2016-2017	16	4	-	2	7

M. Azmath

Head of the Department
Head of the Department,
Department of Computer Science
Mahendra Arts & Science College
Kalippatti (PO.) Pin-637 501.

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List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development (Regulations – 2019)

Programme : BCA

S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill development
1.	Computer Organization and Architecture	M19UCA01	✓	-	✓
2.	Programming in C	M19UCA02	✓	-	✓
3.	Practical – I - Programming in C	M19UCAP01	-	-	✓
4.	Data Structures	M19UCA03	✓	-	✓
5.	Object Oriented programming with C++	M19UCA04	✓	-	✓
6.	Practical - II - Data Structures using C++	M19UCAP02	-	-	✓
7.	Relational Database Management Systems	M19UCA05	✓	-	✓
8.	Operating Systems	M19UCA06	✓	-	✓
9.	Computer Graphics	M19UCA07	✓	-	✓
10.	Practical – III -Oracle	M19UCAP03	-	-	✓
11.	SEC-I - MS-Office	M19UCAS01	-	-	✓
12.	Programming in Java	M19UCA08	✓	-	✓
13.	Client / Server Technology	M19UCA09	✓	-	✓
14.	Software Engineering	M19UCA10	✓	-	✓
15.	Practical – IV Programming in Java	M19UCAP04	-	-	✓
16.	SEC – II – Shell Programming	M19UCAS02	-	-	✓
17.	Web Technology	M19UCA11	✓	-	✓
18.	.Net Programming	M19UCA12	✓	-	✓
19.	Data Communication and Networking	M19UCA13	✓	-	✓

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S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill development
20.	Elective – I- Compiler Design	M19UCAE01	✓	-	✓
21.	Elective – I- Soft Computing	M19UCAE02	✓	-	✓
22.	Elective – I -Software Testing	M19UCAE03	✓	-	✓
23.	Elective – I- Ruby on Rails	M19UCAE04	✓	-	✓
24.	Practical – V -Web Technology	M19UCAP05	-	-	✓
25.	Practical – VI .NetProgramming	M19UCAP06	-	-	✓
26.	SEC – III – OpenSource Technology	M19UCAS03	-	-	✓
27.	Python Programming	M19UCA14	✓	-	✓
28.	Data Mining	M19UCA15	✓	-	✓
29.	Mobile Computing	M19UCA16	✓	-	✓
30.	Elective – II -Cyber Security	M19UCAE05	✓	-	✓
31.	Elective – II -Cloud Computing	M19UCAE06	✓	-	✓
32.	Elective – II-Big Data Analytics	M19UCAE07	✓	-	✓
33.	Elective – II -Distributed Computing	M19UCAE08	✓	-	✓
34.	Practical – VII - Python Programming	M19UCAP07	-	-	✓
35.	Practical – VIII - Data mining using Rapid miner	M19UCAP08	-	-	✓
36.	SEC – IV – Perl Programming	M19UCAS04	-	-	✓

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development (Regulations - 2019)

Programme : BCA

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
1.	Computer Organization and Architecture	M19UCA01	Employability, Skill development	2019 - 2020
2.	Programming in C	M19UCA02	Employability, Skill development	2019 - 2020
3.	Practical - I - Programming in C	M19UCAP01	Skill development	2019 - 2020
4.	Data Structures	M19UCA03	Employability, Skill development	2019 - 2020
5.	Object Oriented programming with C++	M19UCA04	Employability, Skill development	2019 - 2020
6.	Practical - II - Data Structures using C++	M19UCAP02	Skill development	2019 - 2020
7.	Relational Database Management Systems	M19UCA05	Employability, Skill development	2019 - 2020
8.	Operating Systems	M19UCA06	Employability, Skill development	2019 - 2020
9.	Computer Graphics	M19UCA07	Employability, Skill development	2019 - 2020
10.	Practical - III -Oracle	M19UCAP03	Skill development	2019 - 2020
11.	SEC-I - MS-Office	M19UCAS01	Skill development	2019 - 2020
12.	Programming in Java	M19UCA08	Employability, Skill development	2019 - 2020
13.	Client / Server Technology	M19UCA09	Employability, Skill development	2019 - 2020
14.	Software Engineering	M19UCA10	Employability, Skill development	2019 - 2020
15.	Practical - IV Programming in Java	M19UCAP04	Skill development	2019 - 2020
16.	SEC - II - Shell Programming	M19UCAS02	Skill development	2019 - 2020
17.	Web Technology	M19UCA11	Employability, Skill development	2019 - 2020
18.	.Net Programming	M19UCA12	Employability, Skill development	2019 - 2020

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
19.	Data Communication and Networking	M19UCA13	Employability, Skill development	2019 - 2020
20.	Elective – I- Compiler Design	M19UCAE01	Employability, Skill development	2019 - 2020
21.	Elective – I- Soft Computing	M19UCAE02	Employability, Skill development	2019 - 2020
22.	Elective – I -Software Testing	M19UCAE03	Employability, Skill development	2019 - 2020
23.	Elective – I- Ruby on Rails	M19UCAE04	Employability, Skill development	2019 - 2020
24.	Practical – V -Web Technology	M19UCAP05	Skill development	2019 - 2020
25.	Practical – VI .NetProgramming	M19UCAP06	Skill development	2019 - 2020
26.	SEC – III – OpenSource Technology	M19UCAS03	Skill development	2019 - 2020
27.	Python Programming	M19UCA14	Employability, Skill development	2019 - 2020
28.	Data Mining	M19UCA15	Employability, Skill development	2019 - 2020
29.	Mobile Computing	M19UCA16	Employability, Skill development	2019 - 2020
30.	Elective – II -Cyber Security	M19UCAE05	Employability, Skill development	2019 - 2020
31.	Elective – II -Cloud Computing	M19UCAE06	Employability, Skill development	2019 - 2020
32.	Elective – II-Big Data Analytics	M19UCAE07	Employability, Skill development	2019 - 2020
33.	Elective – II -Distributed Computing	M19UCAE08	Employability, Skill development	2019 - 2020
34.	Practical – VII - Python Programming	M19UCAP07	Skill development	2019 - 2020
35.	Practical – VIII - Data mining using Rapid miner	M19UCAP08	Skill development	2019 - 2020
36.	SEC – IV – Perl Programming	M19UCAS04	Skill development	2019 - 2020

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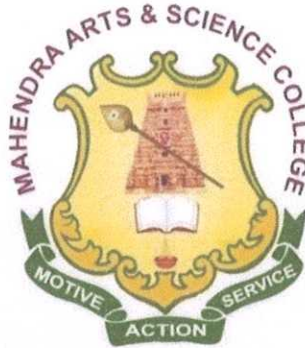
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BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS FOR BCA

OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM

**For the students
admitted from the
Academic Year 2019-2020 onwards**

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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 life long 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 impart 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 subjects 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	1	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	1	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	1	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	1	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	1	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	1	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 .NetProgramming	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 BCSTUDENTS

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 InANSI 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
CO1	S	S	M	S	M
CO2	S	N	M	S	S
CO3	M	S	S	S	M
CO4	M	S	S	M	S
CO5	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, Godfery Muganda	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 Database Systems Using Oracle-A simplified Guide To SQL and PL/SQL	Vijay Nicole Imprints Private Limited	2010
3.	Nilesh shah		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.	DonaldHearn M.Pauline& Baker	Computer Graphics –C Version	Pearson Education Publication	2 nd Edition, 2008

Reference Book

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

COs	PO1	PO2	PO3	PO4	P05
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.

UNITIV

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.

UNITV

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 ProgrammeOutcomes

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

UNITII

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.

UNITIII

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

UNITIV

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	4th Edition 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.

CourseOutcomes

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 VBScript Code in an HTML

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	4thEdition 2011

Reference Books

1.	Kogent Learning Solutions Inc	HTML5 BlackBook	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 javascript.
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 vbscript
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 evalFunction-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, 2nd Edition	2010

Reference Books

1.	Uwe Hansmann, Lotharmerk, Martin S. Nicklous, Thomas Stober	Principles of Mobile Computing	Springer (India) Pvt Ltd, 2nd Edition	2012
2.	Sundara Rajan, Ramesh, Raja Sekaran	Mobile Computing	Sams Publishers, 1st Edition	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
M19UCAP08	PRACTICAL - VIII - DATA MINING USING RAPID MINER	
Credit: 2		

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

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 RecursiveDescentParsing-PredictiveParsing–Bottom-up parsing-ShiftReduce. 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 – CrossOver – 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 – **FuzzyBack Propagation Network** – Language Recognition Type Fuzzy Members –
Fuzzy Neuron – FuzzyBack Propagation Architecture – Learning in Fuzzy Back Propagation –
Applications – **KnowledgeBase 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

UNITIV

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

UNITV

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, Gopalaswamy 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 ProgrammeOutcomes

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

CourseOutcomes

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.

UNITIV

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.

UNITV

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 ProgrammeOutcomes

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.Kostopoulos	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 NoSQL	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

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 McGrawHill	2007
2.	Alan Neibauer	Office The Basics & Beyond	Tata McGrawHill	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.	Stepheng. 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 ProgrammeOutcomes

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, charcode, strlen, strpos, 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



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Kalippatti – 637 501, Namakkal (Dt), Tamil Nadu.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development (Regulations – 2016)

Programme : BCA

S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill Development
1.	Principles of Problem Solving	M16UCA01	✓	-	✓
2.	Programming in C	M16UCA02	✓	-	✓
3.	Core Practical I: Programming in C Lab	M16UCAP01	-	-	✓
4.	Data Structures	M16UCA03	✓	-	✓
5.	Object Oriented Programming with C++	M16UCA04	✓	-	✓
6.	Core Practical II : Data Structures Lab using C++	M16UCAP02	-	-	✓
7.	Design and Analysis of Algorithms	M16UCA05	✓	-	✓
8.	Java Programming	M16UCA06	✓	-	✓
9.	Software Engineering	M16UCA07	✓	-	✓
10.	Multimedia and its Applications	M16UCA08	✓	-	✓
11.	Core: Practical – III: Java	M16UCAP03	-	-	✓
12.	Operating System	M16UCA09	✓	-	✓
13.	Computer Networks	M16UCA10	-	-	✓
14.	Relational Data Base Management System	M16UCA11	✓	-	✓
15.	Programming in Python	M16UCA12	✓	-	✓
16.	Core: Practical – IV: Oracle	M16UCAP04	-	-	✓
17.	Mobile Computing	M16UCA13	✓	-	✓
18.	Internet Programming	M16UCA14	✓	-	✓

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S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill Development
19.	Principles of Cloud Computing	M16UCA15	✓	-	✓
20.	Cyber Security	M16UCA16	✓	-	✓
21.	Elective I: Principles of Human Computer Interaction	M16UCAE01	-	-	✓
22.	Elective I: Computer Graphics	M16UCAE02	-	-	✓
23.	Elective I: Open source Software Development	M16UCAE03	✓	-	✓
24.	Elective I: Object Oriented System Design	M16UCAE04	✓	-	✓
25.	Core Practical V: Internet programming Lab	M16UCAP05	-	-	✓
26.	SBEC-I: Office Automation	M16UCAS01	-	-	✓
27.	SBEC-II: Mobile Application Development	M16UCAS02	-	-	✓
28.	Data Mining and Warehousing	M16UCA17	✓	-	✓
29.	CASE Tools concept & Applications	M16UCA18	✓	-	✓
30.	Big data Analytics	M16UCA19	✓	-	✓
31.	Elective II: Internet of Things	M16UCAE05	✓	-	✓
32.	Elective II: Client / Server Technology	M16UCAE06	✓	-	✓
33.	Elective II: Multimedia Systems	M16UCAE07	✓	-	✓
34.	Elective II: E-Learning	M16UCAE08	✓	-	✓
35.	Core Practical VI: Data Mining Lab using Rapid Miner	M16UCAP06	-	-	✓
36.	SBEC III: Business Process Outsourcing	M16UCAS03	-	-	✓
37.	SBEC IV: Desktop Publishing	M16UCAS04	-	-	✓

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

List of Courses Focusing on Employability/ Entrepreneurship/ Skill Development (Regulations - 2016)

Programme : BCA

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
1.	Principles of Problem Solving	M16UCA01	Employability, Skill development	2016 - 2017
2.	Programming in C	M16UCA02	Employability, Skill development	2016 - 2017
3.	Core Practical I: Programming in C Lab	M16UCAP01	Skill development	2016 - 2017
4.	Data Structures	M16UCA03	Employability, Skill development	2016 - 2017
5.	Object Oriented Programming with C++	M16UCA04	Employability, Skill development	2016 - 2017
6.	Core Practical II : Data Structures Lab using C++	M16UCAP02	Skill development	2016 - 2017
7.	Design and Analysis of Algorithms	M16UCA05	Employability, Skill development	2016 - 2017
8.	Java Programming	M16UCA06	Employability, Skill development	2016 - 2017
9.	Software Engineering	M16UCA07	Employability, Skill development	2016 - 2017
10.	Multimedia and its Applications	M16UCA08	Employability, Skill development	2016 - 2017
11.	Core: Practical - III: Java	M16UCAP03	Skill development	2016 - 2017
12.	Operating System	M16UCA09	Employability, Skill development	2016 - 2017
13.	Computer Networks	M16UCA10	Employability, Skill development	2016 - 2017
14.	Relational Data Base Management System	M16UCA11	Employability, Skill development	2016 - 2017
15.	Programming in Python	M16UCA12	Employability, Skill development	2016 - 2017
16.	Core: Practical - IV: Oracle	M16UCAP04	Skill development	2016 - 2017
17.	Mobile Computing	M16UCA13	Employability, Skill development	2016 - 2017
18.	Internet Programming	M16UCA14	Employability, Skill development	2016 - 2017


M. Arumath


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S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
19.	Principles of Cloud Computing	M16UCA15	Employability, Skill development	2016 - 2017
20.	Cyber Security	M16UCA16	Employability, Skill development	2016 - 2017
21.	Elective I: Principles of Human Computer Interaction	M16UCAE01	Employability, Skill development	2016 - 2017
22.	Elective I: Computer Graphics	M16UCAE02	Employability, Skill development	2016 - 2017
23.	Elective I: Open source Software Development	M16UCAE03	Employability, Skill development	2016 - 2017
24.	Elective I: Object Oriented System Design	M16UCAE04	Employability, Skill development	2016 - 2017
25.	Core Practical V: Internet programming Lab	M16UCAP05	Skill development	2016 - 2017
26.	SBEC-I: Office Automation	M16UCAS01	Skill development	2016 - 2017
27.	SBEC-II: Mobile Application Development	M16UCAS02	Skill development	2016 - 2017
28.	Data Mining and Warehousing	M16UCA17	Employability, Skill development	2016 - 2017
29.	CASE Tools concept & Applications	M16UCA18	Employability, Skill development	2016 - 2017
30.	Big data Analytics	M16UCA19	Employability, Skill development	2016 - 2017
31.	Elective II: Internet of Things	M16UCAE05	Employability, Skill development	2016 - 2017
32.	Elective II: Client / Server Technology	M16UCAE06	Employability, Skill development	2016 - 2017
33.	Elective II: Multimedia Systems	M16UCAE07	Employability, Skill development	2016 - 2017
34.	Elective II: E-Learning	M16UCAE08	Employability, Skill development	2016 - 2017
35.	Core Practical VI: Data Mining Lab using Rapid Miner	M16UCAP06	Skill development	2016 - 2017
36.	SBEC III: Business Process Outsourcing	M16UCAS03	Skill development	2016 - 2017
37.	SBEC IV: Desktop Publishing	M16UCAS04	Skill development	2016 - 2017


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1956

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BACHELOR OF COMPUTER APPLICATIONS

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR BCA

**For the students
admitted from the
Academic Year 2016-2017 onwards**

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MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
KALIPPATTI, NAMAKKAL (DT) - 637501

REGULATIONS FOR BCA (COMPUTER APPLICATIONS) DEGREE COURSE

with Semester System

(Effective from the academic year 2016-2017)

1. OBJECTIVE OF THE COURSE

The three year degree program was instituted in response to the demand for staff with a high level of technical and professional training required by business, industry, government and the academic community to perform specific functions ranging from the lowest level professional to the highest level researcher and educator. The program aims to prepare the students for instruction, research activities related to the discipline, for advanced studies in Computer Applications, and to train them to develop software systems.

2. ELIGIBILITY FOR ADMISSION

A candidate who has passed Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Statistics (Academic stream or vocational stream) as one of the subjects under Higher Secondary Board of Examination, Tamil Nadu or as per norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the College Academic Council subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Computer Applications** degree examination after a course of study of three academic years.

3. DURATION OF THE COURSE

The course for the degree of **Bachelor of Computer Applications** consists of three academic years divided into six semesters with two semesters in one academic year comprising 90 working days for each semester. Examinations are conducted at the end of each semester for the respective subjects.

4. COURSE OF STUDY

The course of study shall comprise instructions in the following subjects according to the syllabus and books prescribed from time to time. This syllabus for

various subjects is clearly demarcated into five viable UNITS in each paper / subject. Part-I, Part-II, Part-III, Part-IV and Part V as prescribed in the scheme of examination.

5. EXAMINATION

The Theory / Practical examination is conducted for 3 hours duration for each paper at the end of every semester. The candidate failing in examinations are permitted to appear for each failed subject(s) in the subsequent examination.

6. a) SUBMISSION OF RECORD NOTE BOOKS FOR PRACTICAL EXAMINATIONS

Candidates appearing for practical examinations should submit record note books prescribed for practical examinations, otherwise the candidates will not be permitted to appear for the practical examinations. However, in genuine cases where the students, who could not submit the record note books, they may be permitted to appear for the practical examinations, provided the concerned Head of the department of the candidate certifies that the candidate has performed the experiments prescribed for the course. For such candidates zero (0) marks will be awarded for record note books and they have to score the minimum pass marks from the external practical exam.

7. REVISION OF REGULATIONS AND CURRICULUM

The college may revise / amend / change the Regulations and scheme of examinations, if needed.

8. PASSING MINIMUM

a) THEORY

The candidate is declared to have passed the end semester examination if the candidate secure 40 marks out of 100(CIA – 10 marks out of 25 and EA – 30 marks out of 75) in each theory paper.

Internal Marks Distribution [CIA] (Total Marks: 25)

- Attendance : 5 Marks
- Assignment : 5 Marks
- Internal Examinations : 15 Marks

b) PRACTICAL

The candidate is declared to have passed the end semester practical examination if the candidate secure 40 marks out of 100(CIA – 16 marks out of 40 and EA – 24 marks out of 60) in in each practical paper.

Practical Marks Distribution

Max. Marks: 100

Internal [CIA]: 40 Marks & External [EA]:

60 Marks

Internal Marks Distribution (Total Marks: 40)

- Preparation of Record & Submission : 15 Marks
- Internal Practical Examinations : 25 Marks

The components for continuous internal assessment are:

- Attendance : 5 Marks
- Model Practical Examinations : 20 Marks

External Marks Distribution (Total Marks: 60)

For each Practical question the marks should be awarded as follows (External):

- | | | |
|--|---|-----|
| (i) Algorithm / Flowchart | - | 20% |
| (ii) Writing the program in the main answer book | - | 30% |
| (iii) Test and debug the programs | - | 30% |
| (iv) Printing the correct output | - | 20% |

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

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 submitting assignment.

9. QUESTION PAPER PATTERN

a) THEORY -Total Marks: 75

Time: 3 Hrs.

PART – A (10 x 2 = 20 Marks)

(Answer ALL questions) (Two questions from each UNIT)

PART – B (5 x 5 = 25 Marks)

(Answer ALL questions) & (One question from each UNIT with Internal Choice)

PART – C (3 x 10 = 30 Marks)

(Answer ANY 3 questions) & (Open Choice – 3 out of 5 questions)

b) PRACTICAL - Total Marks: 60

Time: 3 Hrs.

2 Major Questions each carry 30 Marks. (Either or pattern)

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

AND

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

9. CLASSIFICATION OF SUCCESSFUL CANDIDATES

- FIRST CLASS WITH DISTINCTION – 75% and above
- FIRST CLASS - 60% and above
- SECOND CLASS - 50% to 59%

10. COMMENCEMENT OF REGULATION

These regulations shall take effect from the academic year 2016 – 2017, i.e., for students who are to be admitted to the first year of the course during the academic year 2016 – 2017.

Credit Distribution

Semester	Number of Credits						Total Credits	Max. Marks
	I	II	III	IV	V	VI		
Part I: Tamil	3	3	-	-	-	-	06	200
Part II: English	3	3	-	-	-	-	06	200
Part III: Major	7	7	14	14	16	12	70	1900
Part III: Elective	-	-	-	-	3	3	06	200
Part III: Practical	2	2	2	2	2	2	12	600
Part III: Project	-	1	-	1	-	2	04	300
Part III: Allied	4	4	4	4	-	-	16	400
Part III: Allied Practical	-	-	2	2	-	-	04	200
Part IV: NMEC	-	-	2	2	-	-	04	200
Part IV: SBEC	-	-	-	-	4	4	08	400
Part IV: Value Education	2	-	-	-	-	-	02	100
Part IV: Environmental Studies	-	2	-	-	-	-	02	100
Part V: Value Added	1	1	1	1	-	-	04	400
Part V: Extension Activities	-	-	-	-	-	1	01	-
Cumulative Total	22	23	25	26	25	24	145	5200

S.No .	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
	Semester I								
1	Part I	Tamil-I / Hindi-I / French-I / Malayalam – I / Telugu -I	M16UFTA01/ HI01 / FR01 / MA01 / TE01	5	3	25	75	100	3
2	Part II	English – I	M16UFEN01	5	3	25	75	100	3
3	Part III	Core I: Principles of Problem Solving	M16UCA01	4	3	25	75	100	3
4		Core II: Programming in C	M16UCA02	5	3	25	75	100	4
5		Allied - I : Mathematics	M16UMAA03	5	3	25	75	100	4
6		Core Practical I: Programming in C Lab	M16UCAP01	3	3	40	60	100	2
7	Part IV	Value Education : Yoga	M16UVE01	1	3	25	75	100	2
8	Part V	Value Added : Communicative English - I	M16UVA03	2	3	100	-	100	1
	Total			30		290	510	800	22

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
	Semester II								
1	Part I	Tamil-II / Hindi-II / French-II / Malayalam – II / Telugu –II	M16UFTA02/ HI02 / FR02 / MA02 / TE02	5	3	25	75	100	3
2	Part II	English – II	M16UF EN02	5	3	25	75	100	3
3	Part III	Core III: Data Structures	M16UCA03	4	3	25	75	100	3
4		Core IV: Object Oriented Programming with C++	M16UCA04	5	3	25	75	100	4
5		Allied II : Numerical & Statistical Methods	M16USTA01	5	3	25	75	100	4
6		Core Practical II : Data Structures Lab using C++	M16UCAP02	3	3	40	60	100	2
7	Part IV	Environmental Studies	M16UES01	1	3	25	75	100	2
8	Part V	Value Added : Communicative English II	M16UVA04	2	3	100	-	100	1
9	Part III	Project – I	M16UCAPR1	-	-	100	-	100	1
	Total			30	-	390	510	900	23

S.No .	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credi t Points
						CIA	EA	Total	
	Semester III								
1	Part III	Core V: Design and Analysis of Algorithms	M16UCA05	4	3	25	75	100	4
2		Core VI: Java Programming	M16UCA06	4	3	25	75	100	4
3		Core VII: Software Engineering	M16UCA07	4	3	25	75	100	3
4		Core VIII: Multimedia and its Applications	M16UCA08	4	3	25	75	100	3
5		Allied III : Applied Electronics / Principles of Accountancy	M16UPHA03 / M16UCCA01	4	3	25	75	100	4
6		Core: Practical – III: Java	M16UCAP03	3	3	40	60	100	2
7		Allied : Practical I– Digital Electronics / Accountancy (Tally)	M16UPHAP01 / M16UCCAP01	3	3	40	60	100	2
8	Part IV	NMEC – I: Applied Statistics	M16USTN01	2	3	25	75	100	2
9	Part V	Value Added : Quantitative Aptitude	M16UVA05	2	3	100	-	100	1
	Total			30		330	570	900	25

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
	Semester IV								
1	Part III	Core IX: Operating System	M16UCA09	5	3	25	75	100	4
2		Core X: Computer Networks	M16UCA10	4	3	25	75	100	4
3		Core XI: Relational Data Base Management System	M16UCA11	4	3	25	75	100	3
4		Core XII: Programming in Python	M16UCA12	4	3	25	75	100	3
5		Allied IV : Advanced Electronics / Modern Banking	M16UPHAP02 / M16UCCA02	3	3	25	75	100	4
6		Core: Practical – IV: Oracle	M16UCAP04	3	3	40	60	100	2
7		Allied : Practical II– Applied Electronics / Commerce Practical	M16UPHAP02 / M16UCCAP02	3	3	40	60	100	2
8	Part IV	NMEC – II: Business Communication	M16UCMN04	2	3	25	75	100	2
9	Part V	Value Added: Verbal and Logical Reasoning	M16UVA06	2	3	100	-	100	1
10	Part III	Industrial Literacy	M16UCAPR2	-	3	100	-	100	1

	Total			30	-	430	570	1000	26
S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
	Semester V								
1	Part III	Core XIII: Mobile Computing	M16UCA13	5	3	25	75	100	4
2		Core XIV: Internet Programming	M16UCA14	5	3	25	75	100	4
3		Core XV: Principles of Cloud Computing	M16UCA15	5	3	25	75	100	4
4		Core XVI: Cyber Security	M16UCA16	4	3	25	75	100	4
5		Elective I:		4	3	25	75	100	3
6		Core Practical V: Internet programming Lab	M16UCAP05	3	3	40	60	100	2
7	Part IV	SBEC-I: Office Automation	M16UCAS01	2	3	25	75	100	2
8		SBEC-II: Mobile Application Development	M16UCAS02	2	3	25	75	100	2
	Total			30		215	585	800	25

S.No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
	Semester VI								
1	Part III	Core XVII: Data Mining and Warehousing	M16UCA17	6	3	25	75	100	4
2		Core XVIII: CASE Tools concept & Applications	M16UCA18	6	3	25	75	100	4
3		Core XIX: Big data Analytics	M16UCA19	6	3	25	75	100	4
4		Elective II		5	3	25	75	100	3
5		Core Practical VI: Data Mining Lab using Rapid Miner	M16UCAP06	3	3	40	60	100	2
6	Part IV	SBEC III: Business Process Outsourcing	M16UCAS03	2	3	25	75	100	2
7		SBEC IV: Desktop Publishing	M16UCAS04	2	3	25	75	100	2
8	Part III	Project II	M16UCAPR3	1	3	25	75	100	2
9	Part V	Extension Activities	M16UEX01	-	-	-	-	-	1
	Total			30		215	585	800	24

Semester I	BCA	2016-2017
Core: 1	PRINCIPLES OF PROBLEM SOLVING	
M16UCA01		
Credit: 3		

UNIT I

Introduction to Problem Solving: Problem solving strategies, Problem identification, Problem understanding, Algorithm development, Solution planning (flowcharts, pseudocode, etc.), Modular programming design.

UNIT II

Hardware: Architecture (Mainframe, Mini, PC, Workstations), Real time system, Transaction Processing system, Laptop, Palmtop, Client server, N-Tier. **Introduction to Networks:** LAN, WAN, MAN, etc. **Peripherals:** Information about Input devices (Keyboard, Mouse, Joystick, Track ball, etc.) - Details about Storage devices (Floppy disk, Hard disk, Tapes (Cartridge, DAT), Compact Disk), Information about Monitors, Printers (impact, non-impact) - Various types of plotters.

UNIT III

Software: Software Classification (System, Application, and Utilities). **Operating System:** Introduction, Basic functions of OS, Classification of OS. **Programming Languages:** Generation of Languages and their uses. **Packages:** Spread sheets, DTP Tools, Presentation tools. Application areas of Software - Commercial, Scientific, Real time application etc.

UNIT IV

Multimedia and Internet: Introduction to multimedia - Hardware, Software and applications - Introduction to Internet, Service providers, Internet naming and addressing - Information about electronic mail, Remote login, File Transfer, Usenet-BBS, HTML. **Intranet, Extranet:** Introduction to Intranet and Extranet.

UNIT V

Object Oriented System: Concepts, Benefits of OOS over conventional system. **Enterprise Computing:** About ERP, Activities under ERP. **Mobile Computing – An Introduction to Mobile Computing.**

TEXT BOOKS

1. Dromey, How To Solve It By Computer , Dorling Kindersley (India) Pvt Ltd, 2008.
2. Brain, K. Williams, et. al., *Using Information Technology*, Third edition, TMH, 2000.

REFERENCE BOOKS

1. Turban, Rainer, Potter, *Introduction to Information Technology*, second edition, Wiley Publications.
2. Dennis P. Curtin, et.al., *Information Technology - The Breaking View*, TMH, 2000.

Semester I	BCA	2016-2017
Core: 2	PROGRAMMING IN C	
M16UCA02		
Credit: 4		

UNIT I

Overview of C: History of C – Basic structure of C programs. **Constants, Variables and Data types:** Character Set-C Tokens – Keywords and identifiers – Constants – Variables-Declaring of Variables-Assigning Values to Variables – Data types. **Operators and Expression:** Operators__– Types of Operators-Arithmetic Expressions-Evaluation of expressions – Precedence of arithmetic operators – Type conversions in expressions – Operator precedence and associatively.

UNIT II

Managing Input and Output Operations: Reading and writing a character_– Formatted_input and output. **Decision Making and Branching:** Simple IF, IF-ELSE, Nesting of IF-ELSE,_ELSE-IF ladder, Switch statements-The ?: Operator – GOTO statements. **Decision Making and Looping:** WHILE statement – DO statement – FOR statement_– Jumps in loops_.

UNIT III

Arrays: Definition, Declaration and Initialization of – One dimensional – Two dimensional –_Multi dimensional arrays – Dynamic arrays. **Character arrays and strings:** Declaring and_initializing string variables –Reading strings from terminal – Writing strings to screen_Comparison of Two Strings – String handling functions – Table of strings_.

UNIT IV

User-Defined functions: Introduction –Return values and their types – Function calls – Function declaration –_All category of functions – Nesting of functions – Recursion. **Structures and Unions:** Defining a structure – Declaring structure variables – Accessing structure members –Structure initialization – Copying and comparing structure variables –Operations in Individual Functions–Unions.

UNIT V

Pointers: Declaring and Initializing of pointer variables – Chain of pointers **File Management:** Introduction – Defining and opening a file –Closing a file – Input/output operation on files – Error handling during I/O operations – Random access files – Command line arguments. **The Preprocessor:** Introduction – Macro substitution – File inclusion – Compiler control directives.

TEXT BOOK

1. Programming in ANSI C, by E. Balagurusamy, Tata McGraw Hill, 6th Edition.

REFERENCE BOOKS

1. Let Us C, by Yashavant Kanetkar BPB Publications 13th Edition.
2. Programming in ANSI C, by D. Ravichandran, New Age International (P) Ltd.

Semester I	BCA	2016-2017
Core Practical I	PROGRAMMING IN C	
M16UCAP01		
Credit: 2		

List of Practical's

1. Write a C program to read & calculate any two numbers using all types of operators.
2. Write a C program to find the Greatest in three numbers using IF Statement.
3. Write a C Program to generate the Fibonacci series using FOR Statement.
4. Write a C program to Sort numbers in ascending order using Arrays.
5. Write a C Program to find String Handling Functions.
6. Write a C program to Sort names in Alphabetical order using Strings.
7. Write a C Program to find the factorial using functions.
8. Write a C Program to display Swapping numbers using pointers.
9. Write a C program to find the simple interest using Structures.
10. Write a C Program to display odd & even numbers using files.

Semester II	BCA	2016-2017
Core: 3	DATA STRUCTURES	
M16UCA03		
Credit: 3		

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 – Symbol Table - Recursion.

Unit - II

Arrays: Introduction of an Array – Representation of Arrays - Multidimensional Arrays – Sequential Allocation and Address Calculation – Operations on Arrays – Application of Arrays – Strings as an Array of Characters – String Manipulation - Calling functions Using Arrays – Arrays and Pointers – Dynamic Representation of a Two-dimensional Array.

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 – Polish Notation – **Queues:** Introduction – Representation of Queues - Implementation of Queues – Circular Queue – Priority Queue – D-Queue.

Unit - IV

Trees: Introduction - Binary tree – **Tree Traversal** –Representation of Algebraic representation of expression using tree – Recursive Algorithms – Non Recursive Traversal of a Binary tree – **Binary tree representation** – Application of Binary Trees - Binary search trees – B-tree – Heap- tree.

Unit - V

Searching and Sorting: Sequential and binary search – Indexed search – Hashing Schemes - Hashing functions –Hash collision. **Sorting:** Selection sort – Bubble Sort – Insertion sort – Quick sort – Merge sort – Heap sort. **Graphs:** Introduction – Graph representation – Traversal schemes – Shortest Path Algorithms – Spanning tree – Applications of graphs.

TEXT BOOKS

1. Seymour Lipschitz "Data Structures, Tata McGraw Hill
2. Ellis Horowitz & S. Sahni, Fundamentals of Data Structures, Galgotia Pub.

REFERENCE BOOKS

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

Semester II	BCA	2016-2017
Core: 4	OBJECT ORIENTED PROGRAMMING WITH C++	
M16UCA04		
Credit: 4		

UNIT – I

Principles of Object Oriented Programming: OOPs Paradigm – **Basic Concepts of OOP** – Benefits of OOP – Applications of OOP – Beginning with C++: What is C++ - Structure of C++ Program – A Simple C++ Program – Creating the Source File – Compiling and Linking – Applications of C++

UNIT – II

Elements of C++: Tokens – Keyword – Identifier and Constants – Symbolic Constants - Basic Data Type: User – Defined Data Types – Derived Data Types – Variables: Declaration – Initialization and Reference – 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 – **Constructors and Destructors:** Constructors – Parameterized and Multiple Constructors – Constructors with Default Arguments – Dynamic Initialization – Copy and Dynamic Constructors - Destructors

UNIT – IV

Operator Overloading: Defining operator overloading – Unary and Binary Operator Overloading – Manipulation of Strings – Rules for Overloading – Type Conversion – **Inheritance Extending Classes:** – Defining Derived Classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Base Classes – Pointers – this Pointer.

UNIT – V

Templates: Class Templates – Class Templates with Multiple Parameters – Function Templates – Function Templates with Multiple Parameters – Exception Handling: Basics of Exception Handling – Exception Handling Mechanism – Throwing and Catching Mechanism – Specifying Exceptions.

TEXT BOOK

1. “Object Oriented Programming with C++”, E Balagurusamy , Tata McGraw-Hill Publish, 6th Edition, 2013.

REFERENCE BOOKS

1. “C++, The Complete Reference”, Herbert Schildt, 4th Edition, TMH.
2. “Programming with C++”, D. Ravichandran. TMH, 4th Edition, 2011

Semester II	BCA	2016-2017
Core: Practical II	DATA STRUCTURES USING C++	
M16UCAP02		
Credit: 2		

List of Practical's

1. Write a program to sort numbers in ascending order using arrays.
2. Write a program to perform STACK operations using arrays.
3. Write a program to perform QUEUE operations using arrays.
4. Write a program to implement Single Linked List operations using pointers.
5. Write a program for In-order, Pre-order and Post-order traversal of Binary Tree.
6. Write a Program to Describe the Representation of Graph using Adjacency Matrix
7. Write a program to perform Bubble Sort.
8. Write a program to perform Merge Sort.
9. Write a program to perform Linear Search.
10. Write a program to perform Binary Search.

Semester III	BCA	2016-2017
Core: 5	DESIGN AND ANALYSIS OF ALGORITHMS	
M16UCA05		
Credit: 4		

UNIT – I

Algorithm Analysis: Algorithm – Algorithm Design – Performance Analysis - Time Space Tradeoff - Asymptotic notations - Properties of big-Oh - Conditional Asymptotic Notations - Recurrence equations – Solving recurrence equations - Analysis of linear search – Mathematical Analysis of Non Recursive Algorithm - Mathematical Analysis of Recursive Algorithm.

UNIT – II

Divide and Conquer: General method - Binary search - Finding maximum and minimum- Merge sort - **Greedy Algorithms:** General method - Container Loading - Knapsack problem.

UNIT – III

Dynamic Programming: Introduction - General method – Multistage graphs – All Pairs Shortest paths – Single Source Shortest Paths - Optimal binary search tree (OBST) – 0/1 Knapsack Problem - Travelling Salesperson Problem.

UNIT – IV

Back Tracking: General method - 8 Queen’s Problem - Sum of subsets - Graph Coloring – Hamiltonian Problem – Knapsack Problem.

UNIT – V

Graph Algorithms: Graphs - Graph Traversals - Connected Components - Bi-Connected Components - Spanning Trees – **Branch and Bound:** General Method – Least Cost (LC) Search – Bounding – 0/1 Knapsack problem - LC Branch and Bound Solution – FIFO Branch and Bound Solution.

TEXT BOOK

“Design and Analysis of Algorithms”, Anuradha A. Puntambekar, Technical Publications Pune, 2010

REFERENCE BOOK

“Introduction to the Design and Analysis of Algorithms”, Pearson Education, 2nd Edition, 2008

Semester III	BCA	2016-2017
Core: 6	JAVA PROGRAMMING	
M16UCA06		
Credit: 4		

UNIT I

Java Evolution: Introduction-Java features –How to Java differs from C and C++-Java and Internet-Java and WWW Browser-Hardware & Software Requirements-Java Support Systems-Java Environment-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-Visibility Control-Arrays and Strings.

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-Synchronization.

UNIT V

Managing Errors and Exceptions: Introduction-Types of Errors-Exceptions-Multiple Catch Statements-Using Finally Statement-Throwing Our Own Exceptions. **Applet**

Programming: Introduction-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

Programming with Java, 5th Edition, E. Balagurusamy, Tata McGraw Hill Pub. Ltd., New Delhi.

REFERENCE BOOK

The Complete Reference Java2, 7th Edition, Patrick Naughton, Herbert Schildt, Tata McGraw Hill Pub. Ltd., New Delhi.

Semester III	BCA	2016-2017
Core: VII	SOFTWARE ENGINEERING	
M16UCA07		
Credit: 4		

UNIT –I

Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors - Managerial Issues - Planning a software project: Defining the problem - Developing a Solution Strategy - Planning the Development Process - Planning an Organization structure - Other Planning Activities.

UNIT – II

Software Cost Estimation: Software cost factors - Software Cost Estimation Techniques - Staffing-level Estimation - Estimating Software Maintenance Costs - The Software Requirements Specification - Formal Specification Techniques - Languages and Processors for Requirements Specification.

UNIT – III

Software Design: Fundamental Design Concepts - Modules and Modularization Criteria - Design Notations - Design Techniques - Detailed Design Considerations - Real-Time and Distributed System Design - Test Plans.

UNIT – IV

Implementation Issues: Structured Coding Techniques - Coding Style - Standards and Guidelines - Documentation guidelines –Modern Programming Language Features - Type Checking – Data Abstraction - Concurrency Mechanisms.

UNIT –V

Verification and Validation Techniques: Quality Assurance - Walkthroughs and Inspections - Static Analysis - Symbolic Execution - Unit Testing and Debugging - System Testing - Formal Verification: Enhancing Maintainability during Development - Software Maintenance - Source Code Metrics.

TEXT BOOKS

1. “Software Engineering Concepts”, R.Fairley, Tata Mc-Graw Hill Education, 4th Edition, 2001.
2. “Software Engineering”, R.S. Pressman, Tata Mc-Graw Hill Education, 4th Edition, 2001.

Semester III	BCA	2016-2017
Core: 8	MULTIMEDIA AND ITS APPLICATIONS	
M16UCA08		
Credit: 4		

UNIT –I

Introduction to Multimedia and Hardware Devices: What is Multimedia? - Definitions - Where to use Multimedia. **Introduction to Making Multimedia:** The Stages of a Project - What you need. **Hardware Devices:** Macintosh Verses Windows - Networking Macintosh and Windows - Connections - Memory and Storage Devices - Input Devices - Output Hardware - Communication Devices.

UNIT – II

Multimedia Basic Software Tools and Authoring Tools : Basic software **Tools:** Text Editing and Word Processing Tools - OCR Software - Painting and drawing Tools - 3-D Modeling and Animation Tools - Image-Editing Tools - Sound Editing Tools - Animation, Video and Digital Movie Tools - Helpful Accessories. **Multimedia Authoring Tools:** Making Instant Multimedia - Types of Authoring Tools - Card and Page-Based Authorizing Tools - Icon and Object-Based Authorizing Tools - Cross-Platform Authoring Notes.

UNIT – III

Multimedia Text and Sound: **Text:** The Power of Meaning - About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext. **Sound:** The Power of Sound - Multimedia System Sounds - Digital Audio - Making MIDI Audio - Audio File Formats - MIDI Versus Digital Audio - Adding Sound to Your Multimedia Project - Music CDs - Production Tips.

UNIT – IV

Multimedia Images, Animation and Video: Images: Making Still Images - Color -Image File Formats. **Animation:** The Power of Motion - Principles of Animation - Animation by Computer - Making Animations That Work. **Video:** Using Video - How Video Works - Analog Display Standards - Digital Display Standards - Digital video - Video Recording and Tape Formats - Shooting and Editing Video - Optimizing Video Files for CD-ROM.

UNIT –V

Multimedia and the Internet: **The Internet and How it Works:** Internet History - Internetworking - Connections - Internet Services - The World Wide Web and HTML - Dynamic Web Pages and XML - Multimedia on the Web. **Tools for the World Wide Web:** Web Servers - Web Browsers - Search Engines - Web Page Makers and Site Builders - Plug-ins and Delivery Vehicles - Beyond HTML. **Designing for the World Wide Web:** Working on the Web - Text for the Web - Images for the Web - Sound for the Web - Animation for the Web.

TEXT BOOK

1. Multimedia Making It Work – Seventh Edition by Tay Vaughan – Tata McGraw-Hill Edition 2008.

REFERENCE BOOKS

1. Multimedia Technology and Applications - David Hillman - Galgotia Publications Pvt. Ltd, 1998.
2. Multimedia in Action – James E.Shuman – Vikas Publishing House.
3. Multimedia an Introduction – John Villamil – Casanova, Louis Moliva, PHI.

Semester III	BCA	2016-2017
Core: Practical III	Practical III : JAVA	
M16UCAP03		
Credit: 2		

List of Practical's

1. Write a java program to read any two numbers and perform all types of operators.
2. Write a java program to display student marks and grade using ternary operator.
3. Write a java program for matrix addition using arrays and for loop.
4. Write a java program to display income tax calculation using classes and objects.
5. Write a java program to implement the string handling functions.
6. Write a java program using interface.
7. Write a java program using packages.
8. Write a java program to create three threads and adjusts the priority using multithreading.
9. Write a java program to display any three types of exceptions.
10. Write a java program to display clock using applets.

Semester IV	BCA	2016-2017
Core: 9	OPERATING SYSTEM	
M16UCA09		
Credit: 4		

UNIT - I

Introduction - What is an **Operating System** - History of Operating systems - Computer Hardware Review - Operating system Zoo - OS concepts - System calls- Operating system structure -Processes.

UNIT - II

Threads: Thread usage - Thread Model - Threads Implementation. Inter process Communication – Scheduling. **Deadlock:** Introduction - Principles of Deadlock - Deadlock Detection & Recovery - Deadlock Avoidance - Deadlock Prevention.

UNIT - III

Memory Management: Memory Abstraction - **Virtual Memory** - Page Replacement Algorithm - Segmentation. **Input/output:** Principles of I/O Hardware-Principles of I/O Software.

UNIT - IV

File Systems: Files – Directories - File System Implementation. **Multiprocessor Systems:** Multiprocessor – Multicomputer - Distributed systems.

UNIT - V

Unix: Introduction - History of Unix - Unix Process Management - Memory Management-Input/output Management-Unix File Management.

TEXT BOOKS

1. “Modern Operating Systems”, Andrew S. Tannenbaum, 3rd Edition, PHI Private Limited, New Delhi, 2011.
2. “Modern Operating Systems”, Andrew S. Tannenbaum, 2nd Edition, PHI Private Limited, New Delhi, 2008.

REFERENCE BOOKS

1. “Operating System Principles”, Abraham Silverschatz, Peter Baer Galvin and Greg Gagne, 7th Edition, Wiley India Pvt.Ltd, New Delhi. 2011.
2. “Operating Systems-Internal & Design Principles”, William Stallings, 5th Edition, PHI Private Limited, New Delhi, 2008.

Semester IV	BCA	2016-2017
Core: 10	COMPUTER NETWORKS	
M16UCA10		
Credit: 4		

UNIT - I

Introduction: Uses of computer network – **Network hardware:** LAN, MAN & WAN – **Network Software:** Protocols – Design issues for the layers – Connection oriented Vs Connection less service – **Reference models.**

UNIT - II

Physical Layer: The Theoretical Basis for Data Communication – Guided Transmission media –Wireless Transmission – Communication Satellite – Public Switch Telephone Network – The Mobile Telephone system – Cable Television.

UNIT - III

Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction – Elementary data link protocols – Sliding window Protocols.

Network Layer: Network Layer Design Issues – Routing Algorithms – Congestion Control Algorithms – Quality of service – Internetworking.

UNIT - IV

Transport Layer: Transport services – Elements of Transport Protocols – Internet Transport Protocols. **Application Layer:** Domain name system – Electronic Mail – The World Wide Web – content delivery.

UNIT - V

Security: Introduction – cryptography – Public key algorithms – Digital signatures –Communication security – Authentication protocols – Email security – Web security.

TEXT BOOKS

1. “Computer Networks”, Andrew S. Tanenbaum, David J. Wetherall, Pearson Education, 5th Edition, 2011.
2. “Computer Networks”, Andrew S. Tanenbaum, PHI Pvt. Ltd. 4th Edition, New Delhi, 2003.

REFERENCE BOOK

1. “Data Communication and Networks”, Achyut S. Godbole, Tata McGraw Hill, 3rd Edition, New Delhi.

Semester - IV	BCA	2016-2017
Core: 11	RELATIONAL DATABASE MANAGEMENT SYSTEMS	
M16UCA11		
Credit: 4		

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- Database Architecture - Data Mining and Information.

Retrieval - Specialty Databases - 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 – Denormalization – **Database Security:** Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and roles – Data Encryption – Network Security – Authenticating users to the database.

UNIT-IV

PL/SQL: A Programming Language: History of PL/SQL – 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 – SELECT... FOR UPDATE Cursor – WHERE CURRENT OF CLAUSE – Cursor with Parameters – Cursor Variables – 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, Packages & Triggers:** Procedures – Functions – Packages - Triggers – Data Dictionary Views.

TEXT BOOKS

1. “Database system Concepts”, Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 6th Edition at 2010 (Unit – I & II),.
2. “Fundamentals of Database Management Systems”, Alexis Leon, Mathews Leon, Vijay Nicole Imprints Private Limited, 2nd Edition at 2010(Unit – III).
3. “Database Systems Using Oracle-A simplified Guide To SQL and PL/SQL”, Nilesh shah, 2nd Edition at 2005, PHI. (Unit- IV: Chapters 10,11. Unit-V Chapters 12, 13, 14).

REFERENCE BOOKS

1. “Database Management Systems”, Ramakrishnan, Gehrke, 3rd Edition, McGraw Hill.
2. “Database system Concepts”, Abraham Silberschatz, Henry F.Korth, S.Sudarshan, TMH 5th Edition

Semester - IV	BCA	2016-2017
Core: 12	PROGRAMMING IN PYTHON	
M16UCA12		
Credit: 4		

UNIT I

The Content of Software Development: Learning Programming with Python-Writing a Python Program-A Longer Python Program. **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 associativity- 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- Making Functions Reusable- Documenting Functions and Modules- Functions as Data.

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

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

Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University.

REFERENCE BOOK

Core Python Programming, 2th Edition, Wesley J. Chun, Prentice Hall.

Semester - IV	BCA	2016-2017
Core Practical: IV	Practical IV- Oracle	
M16UCAP04		
Credit: 2		

List of Practical's

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 and using following rules.
 - a. No of units Rate/Unit For
 - b. First 100 units Rs. 6 per unit
 - c. Next 300 units Rs.4.25 per unit
 - d. Beyond 300 units Rs. 3.50 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.

Semester - V	BCA	2016-2017
Core: 13	MOBILE COMPUTING	
M16UCA13		
Credit: 4		

UNIT - I

Introduction: Applications - A Simplified Reference Model. **Wireless Transmission:** Frequencies for radio transmission - Signals - Antennas - Signal Propagation - Multiplexing - Modulation - Spread Spectrum - Cellular System.

UNIT - II

Medium Access Control: Motivation for a Specialized MAC- Hidden and exposed terminals - Near and far terminals - SDMA - FDMA - TDMA - Fixed TDM - Classical Aloha - Slotted Aloha - Carrier Sense Multiple Access - Demand assigned Multiple Access - PRMA Packet Reservation Multiple Access - Reservation TDMA - Multiple Access with Collision Avoidance - Polling - Inhibit Sense Multiple Access. CDMA - Spread Aloha multiple access.

UNIT - III

Telecommunication Systems: GSM - Mobile Services - System Architecture - Radio Interface - Protocols - Localization and Calling - Handover - Security. UMTS and IMT 2000: UMTS releases and standardization - UMTS System Architecture - UMTS Radio Interface -UTRAN - UMTS Handover.

UNIT - IV

Satellite System: History - Applications - Basics - Routing- Localization - Handover. Wireless LAN: IEEE 802.11- System Architecture - Protocol Architecture - Physical Layer - Medium Access Control Layer. Bluetooth: User scenarios - Architecture - Radio Layer - Baseband Layer - Link Manager Protocol.

UNIT - V

Mobile Network Layer: Mobile IP - Goals, Assumption, and Requirements - Entities and Terminology - IP Packet delivery - Agent discovery - Registration. Dynamic Host Configuration Protocol - Mobile Transport Layer: Traditional TCP - Congestion Control - Slow Start - Fast Retransmit.

TEXT BOOK

Jochen Schiller, "Mobile Communications", 2nd Edition, eighth impression, Pearson Education, 2011.

REFERENCE BOOKS

1. William Stallings, "Wireless Communication and Networks", 2nd Edition, Pearson Education, 2005.
2. Theodore Rappaport, "Wireless Communications: Principles and Practice", Prentice Hall Communications, 1996.

Semester - V	BCA	2016-2017
Core: 14	INTERNET PROGRAMMING	
M16UCA14		
Credit: 4		

UNIT I

Introduction to computers and the Internet 2: Introduction – Machine Languages, Assembly Languages and High-level Languages – History of the Internet and WWW – W3C. **Java Script:** Object-Based scripting for the web – Software Technologies. **Web Browser Basics:** Introduction – Connecting to the Internet - Features – Searching the Internet – Keeping Track of Your Favorite Sites – FTP – Other web browsers.

UNIT II

Introduction to XHTML: Introduction – Editing XHTML with example – W3C XHTML validation services – Headings – Linking – Images – Special Characters and Horizontal rules – Lists – Tables – Forms - Internal Linking. **Cascading Style Sheets:** Introduction – Inline styles – Embedded Styles sheets – Conflicting styles – Linking External Style sheets – Positioning Elements – Element Dimensions – Building a CSS Drop-Down Menu- User Style Sheets.

UNIT III

Document Object Model (DOM): Object and Collections – Introduction – Modeling a Document: DOM Nodes and Trees – Traversing and Modifying a DOM Tree – DOM Collections – Dynamic Styles. **Java Script:** Introduction – Simple Program & Modification – Obtaining User Input with Prompt dialogs – Dynamic Welcome Page – Adding Integers – Memory Concepts. **Events:** Introduction – Registering Event Handlers – Event on load – Event on mouse move – Event Bubbling.

UNIT IV

XML and RSS: Introduction – XML Basics – Structuring Data – XML Namespaces – DTDs – W3C XML Schema Documents – XML Vocabularies – Extensible Style sheet Language and XSL Transformations – DOM – RSS. **PHP:** Introduction – PHP Basics – String Processing and Regular Expressions – Comparing Strings – Regular Expressions - Form Processing and Business Logic – Connecting to a Database – Using Cookies – Dynamic Content – Operator Precedence Chart.

UNIT V

Java Server Faces Web Applications: Introduction – Java Web Technologies – Creating and Running Simple Applications in Net beans – JSF Components. **Web Services:** Introduction – Java Web Services Basics – Creating, Publishing, Testing and Describing a Web Service – Consuming a Web Service – SOAP – Session Tracking in Web Services – Consuming a Databases driven web service from a web applications.

TEXT BOOK

1. “Internet & World Wide Web How to Program”, P.J Deital & H.M Deital, Fourth Edition, 2008.

Semester – V	BCA	2016-2017
Core: 15	PRINCIPLES OF CLOUD COMPUTING	
M16UCA15		
Credit: 4		

UNIT – I Getting Started

Cloud Computing Basics: Cloud computing overview – Applications – Internets and the Cloud – First Movers in the Cloud. **Your Organization and Cloud Computing:** When you can use Cloud Computing – Benefits – Limitations – Security Concerns – Regularity Issues. **Cloud Computing With the Titans:** Google – EMC – NetApp – Microsoft – Amazon – Salesforce.com – IBM – Partnership.

UNIT – II

The Business Case for Going to the Cloud: Cloud Computing Services – How Those Applications Help Your Business – Deleting Your Datacenter – Salesforce.com – Thomson Reuters.

Cloud Computing Technology Hardware and Infrastructure: Clients – Security – Network – Services.

UNIT – III

Accessing the Cloud: Platforms – Web Applications – Web APIs – Web Browsers.

Cloud Storage: Overview – Cloud Storage Providers. **Standards:** Applications – Client – Infrastructure – Service.

UNIT – IV Cloud Computing at Work

Software as a Service: Overview – Driving Forces – Company Offerings – Industries.

Software plus Services: Overview – Mobile Device Integration – Providers – Microsoft Online.

UNIT – V

Developing Applications: Google – Microsoft – Intuit Quick base – Cast Iron Cloud – Bungee Connect – Development – Troubleshooting – Application Management. Local Clouds and Thin Clients: Virtualization – Server Solutions – Thin Clients.

TEXT BOOK

1. Cloud Computing – A Practical Approach by Anthony T.Velte, Toby J. Velte and Robert Elsenpeter Indian Edition, McGraw Hill Education (India) Edition, 2013.

Semester - V	BCA	2016-2017
Core: 16	CYBER SECURITY	
M16UCA16		
Credit: 4		

UNIT I

Understanding the Cyber security Landscape: The State of Today's Intrusions- Targeted Intrusions-Dots, DDots & botnets –Advanced persistent threats- The Changing Face of Cybercriminals. **The Role of Malware in Cyber attacks:** Recognizing Key Characteristics of Advanced Malware- Understanding Modern Cyber-attack Strategy- Key Security Lessons and Opportunities. **Why Traditional Security Solutions Fail to Control Advanced Malware** :Rapidly Expanding Attack Vectors - A Lack of Comprehensive End-to-End Visibility- Hash-Based Signature Avoidance -Targeted Malware- Traditional Network Controls Are Ineffective –Firewalls-Intrusion prevention - Proxies -Endpoint protection- Virtual and cloud protection- Crossing Legacy Security Silos- Network versus host-based approaches-Integrating multidisciplinary solutions.

UNIT II

What Next-Generation Security Brings to the Fight: The Next-Generation Firewall- Preventing Infection with Next-Generation Firewalls-Reduce the attack surface- Control advanced malware-enabling applications-Actively test unknown files- Prevent use of circumventors-Investigate any unknown traffic and traffic patterns-Find command-and-control traffic- Automate tracking and correlation. **Creating Advanced Threat Protection Policies:** Safe Enablement through Smart Policies-Application controls-User controls-Network controls- Endpoint controls- Addressing Mobile and Remote Users. **Ten Things to Look for in a Cyber security Solution:** Enforce Allowed Interactions Between Your Data and Users- Identify Threats Everywhere and Always- Protect Data at Multiple Stages in the Attack Lifecycle-Outsmart Threats Designed to Outmaneuver Security Tools-Translate New Intel into Protections in Security Policies- Get Intel and Protection against the Latest Attacks- Enable Quick and Accurate Mitigation-Coordinate Actions across Individual Security Technologies.

UNIT III

Logging: Introduction - Logging in Linux-Spoofing Log Messages - Remote Logging - Logging in Windows - Rotating Windows Logs -Remote Windows Logs -Integrating Windows and Linux Logs . **Malware and Persistence:** Introduction- Document-Based Malware -Creating Malware - Persistence-Kerberos Golden Tickets - Sticky Keys Persistence on Linux Systems-Malware Analysis -Detecting Persistence - Mandiant Redline - Malware Defense.

UNIT IV

Web Attacks: Introduction - Pillaging the Browser -Man in the Middle - Password Attacks-Burp Suite Web Proxy - Burp Suite Brute Force Password Attacks -Custom Password Attacks- Defending Against Password Attacks-Server Reconnaissance – Slowloris- Heartbleed

UNIT V

Firewalls : Introduction- Network Firewalls -Virtual Networking -IPFire - Installing IPFire -IPFire Initial Configuration - Network Traffic Rules -Configuring the Network-Egress Filters and Proxies-IPFire Features-Attacks through a Network Firewall-Attacks from the DMZ Attacking the Internal Network -Bypassing the Firewall.

Textbooks

- 1) Cyber Security for Dummies by Lawrence C. Miller, CISSP, Palo Alto Networks 2nd Edition, 2016 (UNIT I & II)
- 2) Cyber Operations Building, Defending, and Attacking Modern Computer Networks by Mike O’Leary, Apress, 2015(UNIT III-V)

Reference Books

- 1) Denzyl. P. Dayal – Cyber Terrorism and Hoaxes and Law Enforcement, Dominant publishers and Distributors, First Edition, 2005

Semester - V	BCA	2016-2017
Core Practical : V	Practical V- INTERNET PROGRAMMING LAB	
M16UCAP05		
Credit: 2		

1. Write a XHTML code Inserting Special Characters into a webpage.
2. Create a XHTML code to display Nested Lists in your web page.
3. Create a XHTML code to display Tables in your web page.
4. Write a XHTML code to display Form using a Variety of Components in your web page.
5. Write a CSS code to display Positioning element into your web page.
6. Write a CSS code to display Dynamic Styles into your web page.
7. Create a Java Script code to display Memory Concepts into your web page.
8. Create a Java Event Script code to display to Events on Mouse Move into your web page.
9. Write a XML code to display Vocabularies in your web page.
10. Write a PHP code to display Cookies into your web page.

Semester – V	BCA	2016-2017
SBEC-I	SBEC I - OFFICE AUTOMATION	
M16CCAS01		
Credit: 2		

UNIT – I

MS-Word: Introduction to Word: Starting Word – Creating Documents – Saving the Document – Printing a Document – Closing a Document - **Editing a Document:** Opening a Document – Cursor Movement- Editing a Document – Selecting, Deleting, Selecting Text – Undoing and Redoing Changes – Cut, Copy and Paste Text - Help System - Moving Text – **Formatting Text and Paragraph:** Formatting Text- Using the Font Dialog Box- Paragraph Formatting- Using Bullets and Numbers in Paragraphs. **Finding and Replace Text and Spelling Checking:** Finding Text- Replace Command- Spelling Checking and Correction- Inserting Date and Time.

UNIT – II

Enhancing Document: Page Setup- Inserting Page Breaks- Adding Borders and Shading to Paragraph- Using Headers and Footers in the Document- Print Preview. **Columns, Tables and Other Features:** Creating Tables in Document- Formatting a Table - Using Multiple Columns- Sorting Text. **Using Graphics, Templates and Wizards:** Using Templates- Using the Wizard to Create a Document- Inserting Graphics. **Using Mail Merge:** Mail Merge- Examples of Mail Merge- Viewing and Printing Merged Letters- Creating Mailing labels.

UNIT – III

MS-Excel: Excel Basics: Introduction - Menus, Toolbars and their Icons: Menus: File, Edit, View, Insert, Format, Tools, Data and Window Menu – Toolbars and their Icons – Creating a Chart – Database: Data Forms – Data Sort – Data Filters - Formulas and Functions.

UNIT – IV

Charting and Printing Your Data: Charting your Data: Creating Charts-Modifying your Data: Changing Chart types- Enhancing Charts- Formatting Charts automatically.

Printing Worksheet and Charts: Previewing your Worksheet- Setting up pages- Adding Headers and Footers.

UNIT – V

MS-PowerPoint: **Basic PowerPoint File Management:** Starting PowerPoint - Saving- Opening- Creating a Presentation. **Slides and PowerPoint Objects:** Working with Slides- Working with PowerPoint Text Objects. **Multimedia:** Inserting Sound files- Adding Video- Microsoft Online Clip Gallery.

Text Books

- 1) PC Software for Windows- R K Taxali, Tata McGraw-Hill Publishing.
- 2) Office The Basics & Beyond – Alan Neibauer, Tata McGraw-Hill Edition
- 3) Microsoft Excel for Windows 95- Catapult, Microsoft Press.
- 4) Microsoft PowerPoint 2000 – Alexandria Haddad, Tech media.

Semester - V	BCA	2016-2017
SBEC-II	SBEC II - MOBILE APPLICATION DEVELOPMENT	
M16CCAS02		
Credit: 2		

UNIT –I

Introduction: Brief History of Mobile –Evolution of Devices: Brick Era – Candy Bar Era – Feature Phone Era-Smart Phone Era-Touch Era. **The Mobile Ecosystem:** Operators- Networks-Devices-Platforms-Operating Systems-Application Frameworks-Applications-Services. **Why Mobiles?** : Mobile as a Medium.

UNIT – II

Types of Mobile Applications: Mobile Application Medium Types. **Mobile Information Architecture:** Mobile Information Architecture. **Mobile Design:** Elements of Mobile Design- Mobile Design Tools.

UNIT – III

Mobile Web Apps Vs Native Applications: Ubiquity Principle- When to Make a Native Application – When to Make a Mobile Web Application. **Mobile Web Development:** Web Standards- Designing for Multiple Mobile Browsers- Device Plans- Markup- CSS- JavaScript.

UNIT – IV

iPhone Web Apps: Why Web kit? – Markup – CSS - JavaScript- Creating a Mobile Web App- Web Apps as Native Apps- PhoneGap- Tools and Libraries.

UNIT –V

Supporting Devices: Having a Device Plan – Device Testing – Desktop Testing – Usability Testing.

TEXT BOOK

1. Mobile Design and Development – First Edition by Brian Fling – O'Reilly Media, Inc., Edition 2009.

<http://www.scribd.com/doc/63967028/Mobile-Design-and-Development-Practical-concepts-and-techniques-for-creating-mobile-sites-and-web-apps>

REFERENCE BOOKS

1. Reto Meier, Professional Android 2 Application Development, Wiley, Publications, 2011.
2. J. F. DiMarzio, Android –A programmer's Guide, Mc Graw Hill, 2010.

Semester - V	BCA	2016-2017
ELECTIVE: I	PRINCIPLES OF HUMAN COMPUTER INTERACTION	
M16UCAE01		
Credit: 3		

UNIT I

The Human: Introduction-**Input-output channels:** Vision-Hearing-Touch-Movement-
Human Memory: Sensory memory-Short-term memory-Long-term memory –
Thinking: Reasoning and problem solving - Errors – Emotion – Individual differences – Psychology and the design of interactive systems.

UNIT II

The Computer: Introduction – **Text entry devices:** Alphanumeric keyboard-Chord keyboards-Phone pad and T9 entry-Hand writing recognition – Speech recognition-
Positioning, pointing and drawing: The mouse - Touch pad - Trackball and thumbwheel-Joystick and keyboard nipple - Touch-sensitive screens (touch screens) - Stylus and light pen - Digitizing tablet - Eyegaze-Cursor keys and discrete positioning -
Display devices: Bitmap displays-Technologies-Large displays and situated displays - Digital paper – **Physical Controls, Sensors and Special devices:** Special displays-Sound output-Touch, feel and smell-Physical controls-Environment and bio-sensing-**Paper: Printing and Scanning** - Printing - Fonts and page description languages – Screen and page - Scanners and optical character recognition – **Memory:** RAM and short-term memory (STM) - Disks and long-term memory (LTM) - Understanding speed and capacity – Compression - Storage format and standards.

UNIT III

The Interaction

Models of interaction: The terms of interaction-The execution–evaluation cycle-The interaction framework - **Frameworks and HCI – Ergonomic:** Arrangement of controls and displays-The physical environment of the interaction-Health issues-The use of color-Ergonomics and HCI- **Interaction Styles:** Command line interface-Menus-Natural language-Question/answer and query dialog-Form-fills and spreadsheets-The WIMP interface - Point-and-click interfaces - Three-dimensional interfaces - **Elements of the WIMP interfaces - Interactivity – The Context of the interaction - Experience, Engagement and Fun:** Understanding experience - Designing experience - Physical design and engagement.

UNIT IV

Design Process

Interaction Design Basics: What is Design: The Golden rule of design-To Err is human-
Te central message-The user. The Process of Design – User Focus- Scenarios-**Navigation**
Design: Local Structure- Global Structure-hierarchical organization-Global Structure-
Dialog. **Screen Design and Layout:** Tools for Layout-User acting and control– Iteration
and Prototyping.

Design Rules: Principles to Support Usability: Learnability-Flexibility-Robustness.
Guidelines – Golden rules and Heuristics – HCI Patterns.

UNIT V

Evaluation Techniques: What is evaluation? -Goals of Evaluation – Evaluation through
expert analysis- evaluation through user Participation – Choosing an Evaluation Method.
User Support: Introduction – Requirements of user support – Approaches to user
Support – Adaptive help Systems –Designing user support Systems.

TEXT BOOK

Human – Computer Interaction, Alan Dix, Janet Finlay, Gregory D.Abowd, Russell
Beale Pearson Prentice Hall 3rd Edition, 2004.

REFERENCE BOOK

Principles of Human Computer Interaction Design by Dr. Raul Valerie Paperback.

Semester - V	BCA	2015-2016
ELECTIVE: I	COMPUTER GRAPHICS	
M16UCAE02		
Credit: 3		

UNIT – I

Overview of Graphics Systems: Video Display Devices-Refresh Cathode-Ray Tubes-Raster Scan Displays-Random Scan Displays -Color CRT Monitors-Direct-View Storage Tubes-Flat-Panel Displays-Three Dimensional Viewing Devices-Stereoscopic and Virtual Reality Systems-Raster Scan System-Video Controller-Raster -Graphics Software-Coordinate Representations-Graphics Functions-Software Standards-PHIGS Workstations. **Output Primitives:** Points and Lines-Line-Drawing Algorithms-Loading the Frame Buffer-Line Function-Circle-Generating Algorithms-Ellipse-Generating Algorithms-Parallel Curve Algorithms-Curve Functions-Pixel Addressing-Filled-Area Primitives-Fill-Area Functions-Cell Array-Character Generation.

UNIT – II

Attributes of Output Primitives: Line Attributes-Curve Attributes-Color and Grayscale Levels-Area-Fill Attributes-Character Attributes-Bundled Attributes-Inquiry Functions-Ant aliasing-Area Sampling Straight Line Segment-Filtering Techniques-Pixel Phasing-Compensating for Line intensity Difference-Ant aliasing Area Boundaries. Two-Dimensional Geometric Transformations: Basic Transformations-Matrix Representations and Homogeneous Coordinates-Composite Transformations. **Two-Dimensional Viewing:** The Viewing Pipeline-Viewing Coordinate Reference Frame-Window-to-viewport Coordinate Transformation-Two-Dimensional viewing Functions-Clipping Operations-Point Clipping-Line Clipping-Polygon Clipping-Curve Clipping-Text Clipping-Exterior Clipping.

UNIT – III

Structures and Hierarchical Modeling: Structure Concept-Editing Structures-Basic Modeling Concepts-Hierarchical Modeling with Structures-**Graphical User Interfaces and Interactive input Methods:** The User Dialogue-input of Graphical Data-input Functions-Initial Values for Input Device Parameters-interactive Picture-Construction Techniques-Virtual-Reality Environments. **Three-Dimensional Concepts:** Three-Dimensional Display Methods-Three-Dimensional Graphics Packages.

UNIT – IV

Three Dimensional Object Representations: Polygon Surfaces-Curved Lines and Surfaces-Quadric Surfaces-Super quadrics-Blobby Objects-Spline Representations-Cubic Spline Interpolation Methods-Bezier Curves and Surfaces-B-Spline Curves and Surfaces-Beta-Splines-Rational Splines-Conversion Between Spline Representations-Displaying Spline Curves and Surfaces-Sweep Representations -Particle Systems-Physically Based Modeling-Visualization of Data Sets-Visual Representations for Multivariate Data Fields.

Three Dimensional Geometric and Modeling Transformations: Translation-Rotation-Scaling - Composite Transformations-Three-Dimensional Transformation Functions - Modeling and Coordinate Transformations.

UNIT – V

Visible-Surface Detection Methods: Classification of Visible-Surface Detection algorithms-Back-Face Detection-Depth-Buffer Method-Buffer Method-Scan Line Method-Depth Sorting Method-BSP-Tree Method-Area Subdivision Method-Octree Methods-Ray-Casting Method-Curved Surfaces-Wireframe Methods-Visibility-Detection Functions. **Color Models and Color Applications:** Properties of Light-

Standard Primaries and the Chromaticity Diagram-Intuitive Color Concepts-RGB Color Model-YIQ Color Model-CMY Color Model-HSV Color Model-Conversion between HSV and RGB Models-HLS Color Model-Color Selection and Applications. **Computer**

Animation: Design of Animation Sequences-General Computer-Animation Functions-Raster Animations-Computer-Animation Languages-Key-Frame Systems-Motion Specifications

TEXT BOOK

Computer Graphics C Version by Donald Hearn & M Pauline Baker II Edition.

REFERENCE BOOK

Introduction to Computer Graphics David J. Eck.

Semester - V	BCA	2016-2017
ELECTIVE: I	OPEN SOURCE SOFTWARE DEVELOPMENT	
M16UCAE03		
Credit: 3		

UNIT – I

Open Source Software: Definitions and History: -Definition of Terms-A Brief History of Software-**Where Open Source Is Successful:** Analytical Framework-Open Source Is in Widespread Successful Use-**Open Source: The Good, the Bad and the Ugly:** What Is Good about Open Source-Open Source Is Not Enough by Itself-How Choosing Open Source Is More Difficult for You-What Others Say about Open Source.

UNIT – II

Five Immediate Open Source Opportunities: Create an Open Source Lab- Migrate Infrastructure to Samba and Open LDAP- Build Some LAMP Applications- Bring New Desktop Systems to the Underserved- Migrate Applications and Databases to Open Source- **Five More Open Source Opportunities:** Introduction- Directory Services- Email- Groupware and Collaboration- Complex Web Publishing- Manage User Desktops- Other Possibilities.

UNIT – III

Operating Systems: Contents of the Operating System- Linux Distribution Vendors- Enterprise Distribution Vendors- Community-Supported Distribution Vendors- International Alternatives. **Open Source Server Applications:** Infrastructure Services- Web Servers- Database Servers- Mail Servers. **Open Source Desktop Applications:** Introduction- Graphical Desktops- Web Browsers- The Office Suite- Mail and Calendar Clients- Personal Software.

UNIT – IV

How Open Source Software Is Developed: Methodology- Languages Used to Develop Open Source Products- Cross-Platform Code. **Managing System Implementation:** Implementation Roles- Open Source Impact on Team Issues- Implementation Process- Implementation Principles- Key Documents- Migration- Interacting with the Open Source Community.

UNIT – V

Application Architecture: Types of Systems- Tiered Design- Managing Performance and Scalability- Interoperability- Development Platform Choices. **The Cost of Open Source Systems:** Total Cost of Ownership- Types of Costs- Scenarios- **Licensing:** Types of Licenses- Licenses in Use- Mixing Open and Closed Code- Dual Licensing- Other Intellectual Property Issues.

TEXT BOOK

Open Source Software: Implementation and Management by Paul Kavanagh.

REFERENCE BOOK

Fundamentals Of Open Source Software Kindle Edition by M. N. RAO.

Semester - V	BCA	2016-2017
ELECTIVE: I	OBJECT ORIENTED SYSTEM DESIGN	
M16UCSE04		
Credit: 3		

UNIT I

An overview of Object oriented Systems Development: Object Orientation, Object Basics: An Object - Oriented Philosophy, Objects, grouping objects in classes, Attributes; Object Behavior and methods, Encapsulation and Information Hiding, Class Hierarchy, Polymorphism, Object Relationships, and Associations, Aggregations and Object Containment. **Object-Oriented Systems Development Life Cycle:** Introduction -The software Development Process, Building High Quality software.

UNIT II

Object Oriented Methodology: Introduction, Rumbaugh Object Modeling Technique, The Booch Methodology, The Jacobson methodologies, Patterns. **Unified Modeling Language:** Introduction, Static and Dynamic Models, UML Diagrams, UML class Diagram, Use Case Diagram, UML Dynamic Modeling, **Model Management:** Packages And Model Organization, UML Meta - Model

UNIT III

Identifying Use Cases: Introduction, Business Object Analysis: Understanding the Business Layer, Use -Case Driven Object - Oriented Analysis: the Unified Approach, Business Process Modeling, Use – Case Model, Developing Effective Documentation, **Object Analysis:** Classification introduction, Classification Theory, Approaches For Identifying Classes, Noun Phrase Approach, Classes, Responsibilities and Collaborators process, Naming Classes, **Identifying Object Relationships, Attributes, and Methods** : Associations, Super - Sub Class Relationships, A part of Relationships- Aggregations, **Class responsibility:** Defining Attributes by analyzing Use Case and other UML Diagrams, **Object Responsibility:** Methods and messages.

UNIT IV

The Object Oriented Design Process, Object Oriented Design Axioms, Corollaries, Design patterns, Designing Classes: The Process, Class Visibility; Designing Well - Defined Public, Private and Protected protocols, Designing Classes: Refining Attributes, Designing Methods and Protocols, Packages and managing Classes, Access Layer: Object Store and Persistence: Database Management systems, Object Oriented Database Management Systems, Object relational systems, View Layer designing Interface Objects: View Layer Classes, Macro - Level Process, Micro level Process.

UNIT V

Case Study

A payroll program: structures approach, object - oriented approach. Case Study:- ViaNet Bank ATM: Identifying actors and use cases for viaNet bank ATM systems - vianet bank ATM systems packages. Case study: relationship analysis for the vianet bank atm system, Case Study: Designing the Access Layer for the ViaNet Bank ATM. Software Quality assurance: Testing Strategies, Test Cases, Test Plan, Continuous Testing, Myers Debugging Principles.

TEXT BOOKS

1. Ali Bahrami, Object Oriented Systems Development, McGraw hill,1999.
2. Booch, Object Oriented Analysis and Design Pearson Education
3. Criag Larman, Applying UML and Patterns, an Introduction to Object –Oriented Analysis and Design. Pearson Education 1998
4. Rebecca Wirfs-Brock et al: Designing Object-Oriented software, Prentice-Hall India 1990
5. Grady Booch, Unified modeling Language User Guide, Pearson Education,
6. Gamma: Design patterns: Elements of Reusable Object Oriented Software, Pearson Education
7. Shalloway, Design Patterns Explained Pearson Education
8. Martin. J. and Odell, J, object oriented methods: a Foundation, Prentice Hall, 1995.

Semester - VI	BCA	2016-2017
Core: 17	DATA MINING AND WAREHOUSING	
M16UCA17		
Credit: 3		

UNIT I**DATA MINING**

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT II**ASSOCIATION RULE MINING AND CLASSIFICATION**

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT III**CLUSTERING AND TRENDS IN DATA MINING**

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

UNIT IV**BUSINESS ANALYSIS**

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – **Online Analytical Processing (OLAP)** – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multi relational OLAP – Categories of Tools – OLAP Tools and the Internet

UNIT V**DATA WAREHOUSING**

Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools – Metadata.

Text Books

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw –Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

Reference Books

1. Pang – Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Aja, “Insight into Data Mining Theory and practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
3. G.K. Gupta, “Introduction to Data Mining with Case Studies”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T. Larose, “Data Mining Methods and Models”, Wiley – Inter science, 2006.

Semester - VI	BCA	2016-2017
Core: 18	CASE TOOLS CONCEPTS AND APPLICATIONS	
M16UCA18		
Credit: 4		

UNIT I

Data Modeling: Business Growth-Organizational Model-Case Study of student MIS-What is the purpose of such Models-Understanding the business-Types of models-model development approach-the case for structural development-advantages of using a case tool. **System analysis and design-what is DFD**-General Rules for Drawing DFD-Difference between Logical data flow diagram and Physical data flow diagram-Software verses Information Engineering-How case tools store information.

UNIT II

Approach used to solve the problem statement: How to deal with a problem statement-Data flow diagram for Payroll System-Presentation Diagram for Payroll System-schematics of the model-Forms-Screens-Menu Screens-Data entry Screens-Report Output Format-Utilities. **Installation of Ubridge and Synthesis:** How to use the tools in Ubridge Synthesis for case-Installation of Ubridge Synthesis-Computer Aided Software Engineering-Getting Ubridge to work-Setup-Assign-Housekeep-The Ubridge page.

UNIT III

Introduction to Ubridge: Introduction - Main flow of the system prototyping your Report-Introducing the Novice Model of the Operation. Introducing Synthesis - Synthesis basic – Synthesis - Menu Drawing the screen-Requirement Definition-Diagram-Data Dictionary-Document-Synthesis Main Administration - Synthesis reference - importing and exporting screen.

UNIT IV

Diagram definition tool: Introduction-Starting DDT-Drawing your own Icon - Defining the connection rules-Rebuilding your icon. **Object oriented methodologies:** Rambaugh et.al.'s object modeling techniques-The Booch methodology –The Jacobson et.al. Methodologies-Pattern-Frame works-The Unified Approach.

UNIT V

Introduction to UML-UML Diagram-Class Diagram-Use Case Diagram-Interaction Diagram-Sequence Diagram-Collaboration Diagram-State Chart Diagram-Activity Diagram-Component Diagram-Deployment Diagram.

TEXT BOOKS

1. Case Tools Concepts and Applications, Ivan N Bayross, BPB Publications
2. Object Oriented System Development using the Unified Modeling Language, McGraw Hill International edition.

REFERENCE BOOKS

Software Engineering: A Practitioner's Approach, Roger S Pressman, McGraw Hill International Edition.

Semester - VI	BCA	2016-2017
Core: 19	BIG DATA ANALYTICS	
M16UCA19		
Credit: 4		

UNIT I

Big Data: From the business Perspective – What is Big Data? – Why Is Big Data Important? – Why IBM for Big Data? - **Big Data:** From the Technology Perspective – All about Hadoop: The History of Hadoop – Components of Hadoop – Application Development in Hadoop – Getting Your Data into Hadoop – Other Hadoop Components – Wrapping It Up.

UNIT II

InfoSphere BigInsights: Analytics for Big - Data at Rest - Administrative Tooling – Security - Enterprise Integration - Improved Workload Scheduling: Intelligent Scheduler - Adaptive MapReduce - Data Discovery and Visualization: BigSheets - Advanced Text Analytics Toolkit - Machine Learning Analytics - Large-Scale Indexing -BigInsights Summed Up.

UNIT III

IBM InfoSphere Streams: Analytics for Big Data in Motion - InfoSphere Streams Basics - Industry Use Cases for InfoSphere Streams - How InfoSphere Streams Works - What's a Stream? - The Streams Processing Language - Source and Sink Adapters - Operators - Streams Toolkits - Enterprise Class - High Availability - **Consumability: Making the Platform Easy to Use** - Integration is the Apex of Enterprise Class Analysis.

UNIT IV

Microsoft's Plan for Big Data: Microsoft's Hadoop Distribution - Developers, Developers, Developers - Streaming Data and NoSQL - Toward an Integrated Environment - The Data Marketplace. **Big Data in the Cloud:** IaaS and Private Clouds - Platform solutions - Amazon Web Services – Google - Microsoft - Big data cloud platforms compared. **Data Marketplaces:** What Do Marketplaces Do? – Infochimps – Factual - Windows Azure Data Marketplace – Data Market - Data Markets Compared - Other Data Suppliers.

UNIT V

The NoSQL Movement: Size, Response, Availability - Changing Data and Cheap Lunches - The Sacred Cows - Other features - In the End. **Why Visualization Matters:** A Picture Is Worth 1000 Rows - Types of Visualization - Explaining and exploring - Your Customers Make Decisions, Too - Do Yourself a Favor and Hire a Designer. **The Future of Big Data:** More Powerful and Expressive Tools for Analysis - Streaming Data Processing - Rise of Data Marketplaces.

TEXT BOOKS

- 1) “**Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data**” by **Paul C. Zikopoulos, Chris Eaton Dirk, deRoos Thomas, Deutsch George, Lapis – Mc Graw Hill Companies Publication,2012, (Unit I, Unit II, Unit III).**
- 2) “**Planning for Big Data**” by **O’Reilly Radar Team, Published by O’Reilly Media,2012 (Unit IV, Unit V)**

REFERENCE BOOKS

- 1) Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
- 2) Jy Liebowitz, “Big Data and Business analytics”,CRC press, 2013.

Semester – VI	BCA	2016-2017
Core Practical : 7	PRACTICAL – VII - DATA MINING USING RAPID MINOR	
M15UCAP07		
Credit: 2		

List of Practical's

1. Data Cleaning
2. Data Exploration
3. Data Prep
4. Data Blending
5. Data Cleaning
6. Data Modeling
7. Data Validation
8. Cloud Execution
9. Scheduling
10. Integration

Semester – VI	BCA	2016-2017
SBEC-III	SBEC III - BUSINESS PROCESS OUTSOURCING	
M16CCAS03		
Credit: 2		

UNIT – I

BPO – Meaning – Definition – Evaluation & Recent Development – In sourcing – Outsourcing – Needs – Technical requirement – Eligibility.

UNIT – II

Call Centers – Functions – Processes – classifications – Telemarketing – Tele selling – Preparing for a Job – Approach – Preparation – Training – Selection Process.

UNIT – III

Improving Efficiency – Handling Calls – Team Player – Pleasing the Customers – Converse efficiently – Reducing stress.

UNIT – IV

Numerical aptitude – Basic Computer Skills – Type Master – Written Test – Interviews – Telephonic Interviews.

UNIT – V

Good Communicator – Ability to lead – Pleasing personality – Physical fitness – Dress Consciousness – Other Personality development.

REFERENCE BOOKS

1. Fundamentals of Computer Science & Communication engineering by Alexis Leon, Mathew Leon.
2. Quantitative Aptitude by R.S. Agarwal
3. English Conversation Practice by Grand Tailor
4. English Course by Lingua Phone
5. Adult Faculty by Kev Nair

Semester – VI	BCA	2016-2017
SBEC-IV	SBEC IV - DESKTOP PUBLISHING	
M16CCAS04		
Credit: 2		

Unit I

Adobe PageMaker: Using the toolbox-Viewing pages- Working with text and graphics - Moving between pages - Correcting mistakes- Creating a publication from scratch - Setting up pages - Using Master pages – Using the zero point - Nonprinting guides - Setting up ruler guides – Numbering pages.

Unit II

Adobe PageMaker: Creating text blocks - Formatting text - Duplicating an object- Control palette basics - Grouping and ungrouping objects – Locking objects - Aligning and distributing objects - Rotating an object – Reflecting an object - Skewing an object - Cropping a graphic - Printing in PageMaker.

Unit III

CorelDraw: CorelDraw terminology and concepts - application window - workspace tools -working with template - zooming and panning – working with views - lines, outlines and Brush Strokes.

Unit IV

CorelDraw: Formatting lines and Outlines - Drawing rectangles and squares - Applying uniform fills - Applying pattern fills.

Unit V

CorelDraw: Working with color - working with custom color palettes - understanding color models - using Special Effects - Using Text in Drawing - Adding bitmapped images - Print a drawing.

TEXT BOOK

1. Vishnu Priya Singh and Meenakshi Singh, “DTP Course Book”, CompuTech Publication Ltd., New Delhi, 2nd Edition, 2011.

REFERENCE BOOK

Shirish Chavan, “Rapidex DTP Course”, Unicorn Books Pvt. Ltd., New Delhi-02, Revised and Enlarged Edition - 2005.

Semester - VI	BCA	2016-2017
Elective: II	INTERNET OF THINGS	
M16UCAE05		
Credit: 3		

Unit I

M2M to IoT: The Vision-Introduction - From M2M to IoT - M2M towards IoT-the global context - A use case example - Differing Characteristics.

Unit II

M2M to IoT – A Market Perspective: Introduction - Some Definitions -M2M Value Chains - IoT Value Chains - An emerging industrial structure for IoT - The international driven global value chain and global information monopolies. **M2M to IoT- An Architectural Overview:** Building architecture - Main design principles and needed capabilities - An IoT architecture outline - standards considerations.

Unit III

M2M and IoT Technology Fundamentals: Devices and gateways - Local and wide area networking - Data management - Business processes in IoT - Everything as a Service (XaaS) - M2M and IoT Analytics - Knowledge Management.

Unit IV

IoT Architecture-State of the Art: Introduction - State of the art - **Architecture Reference Model:** Introduction - Reference Model and architecture - IoT reference Model. **IoT Reference Architecture:** Introduction - Functional View - Information View - Deployment and Operational View - Other Relevant architectural views.

Unit V

Real-World Design Constraints: Introduction - Technical Design constraints-hardware is popular again - Data representation and visualization - Interaction and remote control. **Industrial Automation-** Service-oriented architecture-based device integration. SOCRADES: realizing the enterprise integrated Web of Things - IMC-AESOP: from the Web of Things to the Cloud of Things - **Commercial Building Automation-** Introduction, Case study: phase one-commercial building automation today.

Textbook

Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **“From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”**, 1st Edition, Academic Press, 2014.

Reference Books

1. Vijay Madisetti and Arshdeep Bahga, **“Internet of Things (A Hands-on-Approach)”**, 1st Edition, VPT, 2014.
2. Francis daCosta, **“Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”**, 1st Edition, Apress Publications, 2013

Semester - VI	BCA	2016-2017
Elective: II	CLIENT / SERVER TECHNOLOGY	
M16UCAE06		
Credit: 3		

UNIT I

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

UNIT II

Components of Client / Server Applications – 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

Components of Client / Server Applications – **Connectivity:** Open System Interconnect – Communications Interface Technology – Inter-process communication – WAN Technologies.

UNIT IV

Components of Client / Server Applications – Software. Components of Client / Server Applications – Hardware

UNIT V

Components of Client / Server applications – Service and Support: System Administration. The Future of Client / Server Computing: Enabling Technologies – Transformational Systems.

TEXT BOOK

Client / Server Computing, Patrick Smith, Steve Guenferich, 2nd edition, PHI. (Chapters 1-8 & 10)

REFERENCE BOOKS

1. Robert Orfali, Dan Harkey, Jeri Edwards: The Essential Client/Server Survival Guide, 2nd edition, Galgotia Publications.
2. Dewire and Dawana Travis, Client/ Server Computing, TMH

Semester - VI	BCA	2016-2017
Elective: II	MULTIMEDIA SYSTEMS	
M16UCAE07		
Credit: 3		

UNIT-I

Introduction to Multimedia and Hardware Devices: What is Multimedia? - Definitions - Where to use Multimedia. **Introduction to Making Multimedia:** The Stages of a Project - What you Need. **Hardware Devices:** Macintosh Verses Windows - Networking Macintosh and Windows - Connections - Memory and Storage Devices - Input Devices - Output Hardware - Communication Devices.

UNIT-II

Multimedia Text and Sound: Text: The Power of Meaning - About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext. **Sound:** The Power of Sound - Multimedia System Sounds - Digital Audio - Making MIDI Audio - Audio File Formats - MIDI Versus Digital Audio - Adding Sound to Your Multimedia Project - Music CDs - Production Tips.

UNIT-III

Multimedia Images, Animation and Video: Images: Making Still Images - Color - Image File Formats **Animation:** The Power of Motion - Principles of Animation - Animation Techniques - Animation by Computer - Making Animations That Work **Video:** Using Video - How Video Works - Analog Display Standards - Digital Display Standards - Digital video - Video Recording and Tape Formats - Shooting and Editing Video - Optimizing Video Files for CD-ROM.

UNIT-IV

Multimedia Basic Software Tools and Storage and Retrieval Technologies: Basic software Tools: Text Editing and Word Processing Tools - OCR Software - Painting and drawing Tools - 3-D Modeling and Animation Tools - Image-Editing Tools - Sound Editing Tools - Animation, Video and Digital Movie Tools - Helpful Accessories. **Storage and Retrieval Technologies:** Magnetic Media Technology - Optical Media - Worm Optical drives - Hierarchical Storage Management - cache Management for Storage Systems.

UNIT-V

Multimedia and the Internet: The Internet and How it Works: Internet History - Internetworking - Connections - Internet Services - The World Wide Web and HTML - Dynamic WebPages and XML - Multimedia on the Web. **Tools for the World Wide Web:** Web Servers - Web Browsers - Search Engines - Web Page Makers and Site Builders - Plug-ins and Delivery Vehicles - Beyond HTML. **Designing for the World Wide Web:** Working on the Web - Text for the Web - Images for the Web - Sound for the Web - Animation for the Web.

TEXT BOOKS

2. Multimedia Making It Work – Seventh Edition by Tay Vaughan – Tata McGraw-Hill Edition 2008.
3. Andliegh Pk and Thakrar K “Multimedia Systems”, Addison Wesley Longman.

REFERENCE BOOKS

1. Multimedia Technology and Applications - David Hillman - Galgotia Publications Pvt. Ltd, 1998.
2. Multimedia in Action – James E. Shuman – Vikas Publishing House.
3. Multimedia an Introduction – John Villamil – Casanova, Louis Moliva, PHI.

Semester – VI	BCA	2016-2017
Elective: II	E-LEARNING	
M16UCAE08		
Credit: 3		

UNIT I

Designing E-Learning – What is E-Learning?- What is E-Learning Design? – Design quickly and reliably – Absorb Type Activities – Presentations – Sharing Stories – Readings – Field Trips.

UNIT II

Do Type Activities – Practice Activities – Discovery Activities – Games and Simulations – Connect type activities – Ponder activities – Job aids – Research activities – Original work activities.

UNIT III

Tests – Select the right type of question – Write effective questions – Combine questions effectively – **Give meaningful feedback** –Perfect your testing – **Explain the test** – Consider alternative to formal tests.

UNIT IV

Topics – **Design the Components of the topic – Design reusable topics** – Lessons - Way of organizing lessons – Designing lessons as objects – Strategic Designs – Choose the kind of e-Learning - follow quality standards.

UNIT V

Design for the Virtual Classroom – Select and use collaboration tools – Conduct online meetings – Guide discussion activities – **Manage virtual courses – Visual display – Window characteristics – Legibility – Layout.**

Text Book

1. E-Learning by Design by William Horton – 2006 John Wiley & Sons.