

# **MAHENDRA ARTS & SCIENCE COLLEGE**

**(AUTONOMOUS)**

**Affiliated to Periyar University, Salem**

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

**KALIPPATTI - 637501**



## **BACHELOR OF SCIENCE**

### **SYLLABUS FOR B.Sc. COMPUTER SCIENCE**

**OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM**

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

**MAHENDRA ARTS & SCIENCE COLLEGE (Autonomous)**  
**(Affiliated to Periyar University)**  
**DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS**  
**B.Sc. Computer Science**

**PREAMBLE**

B.Sc Computer Science is a systematically designed three year course that prepares the student for a career in software industry. The syllabus of Computer Science subject along with that of two allied subjects (Mathematics and Physics) forms the required basics for pursuing higher studies in computer science. The syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in software industry.

**I - PROGRAMME EDUCATIONAL OBJECTIVES**

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

**II - PROGRAMME OUTCOMES**

- Provides a solid foundation in the discipline of Computer Science 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 Science 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 science. 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 science to meet the needs of all students.

### **2. Eligibility for Admission**

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

### **3. Duration of the Course**

The course of study of Bachelor of Science in Computer Science 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	M19UCS01	5	-	4	25	75	100
	CORE COURSE-II	Programming in C	M19UCS02	5	-	4	25	75	100
	CORE PRACTICAL –I	Practical –I - Programming in C	M19UCSP01	-	3	2	40	60	100
	ALLIED COURSE-I	Allied – I- 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
<b>Total</b>				<b>27</b>	<b>3</b>	<b>22</b>	<b>190</b>	<b>510</b>	<b>700</b>

### 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	M19UCS03	5	-	4	25	75	100
	CORE COURSE-IV	Object Oriented Programming with C++	M19UCS04	5	-	4	25	75	100
	CORE PRACTICAL -II	Practical –II- Data Structures Using C++	M19UCSP02	-	3	2	40	60	100
	ALLIED COURSE-II	Allied – II- 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
<b>Total</b>				<b>27</b>	<b>3</b>	<b>22</b>	<b>190</b>	<b>510</b>	<b>700</b>

**SEMESTER: III**

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-III/Hindi-III / French-III	M19UFTA03	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – III	M19UFEN03	5	-	3	25	75	100
III	CORE COURSE-V	Relational Database Management Systems	M19UCS05	5	-	4	25	75	100
	CORE PRACTICAL - III	Practical – III Oracle	M19UCSP03	-	3	2	40	60	100
	ALLIED COURSE-III	Allied – III - Applied Electronics	M19UPHA01	5	-	4	25	75	100
	ALLIED PRACTICAL -I	Allied Practical – I – Basic Electronics - I	M19UPHAP01	-	3	2	40	60	100
IV	NMEC - I			2	-	2	25	75	100
	SEC-I	SEC-I – MS – Office	M19UCSS01	2	-	2	25	75	100
<b>Total</b>				<b>24</b>	<b>6</b>	<b>22</b>	<b>230</b>	<b>570</b>	<b>800</b>

**SEMESTER: IV**

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-IV/French – IV/ Hindi – IV	M19UFTA04	5	-	3	25	75	100
II	LANGUAGE COURSE-II	English – IV	M19UFEN04	5	-	3	25	75	100
III	CORE COURSE-VI	Programming in Java	M19UCS06	5	-	4	25	75	100
	CORE PRACTICAL – IV	Practical – IV – Programming in Java	M19UCSP04	-	3	2	40	60	100
	ALLIED COURSE-IV	Allied – IV – Advanced Electronics	M19UPHA02	5	-	4	25	75	100
	ALLIED PRACTICAL –II	Allied Practical – II – Basic Electronics – II	M19UPHAP02	-	3	2	40	60	100
IV	NMEC-II			2	-	2	25	75	100
	SEC-II	SEC-II – Shell Programming	M19UCSS02	2	-	2	25	75	100
V	EXTENSION ACTIVITIES	Extension Activities	M19UEX01	-	-	1	-	-	-
<b>Total</b>				<b>24</b>	<b>6</b>	<b>23</b>	<b>230</b>	<b>570</b>	<b>800</b>

**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-VII	Web Technology	M19UCS07	5	-	4	25	75	100
	CORE COURSE-VIII	.Net Programming	M19UCS08	5	-	4	25	75	100
	CORE COURSE- IX	Data Communication and Networking	M19UCS09	4	-	4	25	75	100
	CORE COURSE-X	Operating Systems	M19UCS10	4	-	4	25	75	100
	ELECTIVE COURSE - I	Elective – I		4	-	4	25	75	100
	CORE PRACTICAL – V	Practical – V - Web Technology	M19UCSP05	-	3	2	40	60	100
	CORE PRACTICAL – VI	Practical – VI - .Net Programming	M19UCSP06	-	3	2	40	60	100
IV	SEC-III	SEC-III – Open Source Technology	M19UCSS03	2	-	2	25	75	100
III	Project Work		Exam at VI Semester						
<b>Total</b>				<b>24</b>	<b>6</b>	<b>26</b>	<b>230</b>	<b>570</b>	<b>800</b>

**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-XI	Python Programming	M19UCS11	5	-	4	25	75	100
	CORE COURSE-XII	Data Mining	M19UCS12	5	-	4	25	75	100
	CORE COURSE-XIII	Mobile Computing	M19UCS13	4	-	4	25	75	100
	CORE COURSE-XIV	Software Engineering	M19UCS14	4	-	4	25	75	100
	ELECTIVE COURSE - II	Elective – II		4	-	4	25	75	100
	CORE PRACTICAL - VII	Practical – VII – Python Programming	M19UCSP07	-	3	2	40	60	100
	CORE PRACTICAL - VIII	Practical – VIII - Data mining using Rapid miner	M19UCSP08	-	3	2	40	60	100
	CORE PROJECT	Project	M19UCSPR1	-	-	2	40	60	100
IV	SEC-IV	SEC-IV - Perl Programming	M19UCSS04	2	-	2	25	75	100
	Additional Credit Given for SWAYAM / MOOC			-	-	1	-	-	-
<b>Total</b>				<b>24</b>	<b>6</b>	<b>28</b>	<b>270</b>	<b>630</b>	<b>900</b>
<b>Total</b>				<b>150</b>	<b>30</b>	<b>143</b>	<b>1340</b>	<b>3360</b>	<b>4700</b>

### 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	3	3	-	-	12	20	04	400
II	Language - II	3	3	3	3	-	-	12	20	04	400
III	Major	8	8	4	4	16	16	56	66	14	1400
	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	-
<b>Total</b>		<b>22</b>	<b>22</b>	<b>22</b>	<b>23</b>	<b>26</b>	<b>28</b>	<b>143</b>	<b>180</b>	<b>48</b>	<b>4700</b>

#### ALLIED SUBJECTS FOR B.Sc. COMPUTER SCIENCE

SEMESTER	PAPER NAME	PAPER CODE
I	Allied - I - Mathematics - I - Algebra, Integral Calculus and Fourier series	M19UMAA01
II	Allied - II - Mathematics - II - Differential Equations and Laplace Transforms	M19UMAA02
III	Allied - III - Applied Electronics	M19UPHA01
	Allied Practical - I - Basic Electronics - I	M19UPHAP01
IV	Allied - IV - Advanced Electronics	M19UPHA02
	Allied Practical - II - Basic Electronics - II	M19UPHAP02

**ELECTIVE SUBJECTS FOR B.Sc. COMPUTER SCIENCE**  
**(Students can choose any one course from the given list)**

<b>Semester</b>	<b>ELECTIVE - I</b>		
<b>V</b>	<b>S.No</b>	<b>Course Title</b>	<b>Course Code</b>
	1.	Compiler Design	M19UCSE01
	2.	Artificial Intelligence	M19UCSE02
	3.	Distributed Computing	M19UCSE03
	4.	Ruby on Rails	M19UCSE04
<b>ELECTIVE - II</b>			
<b>VI</b>	<b>S.No</b>	<b>Course Title</b>	<b>Course Code</b>
	1.	Network Security	M19UCSE05
	2.	Cloud Computing	M19UCSE06
	3.	Multimedia Systems	M19UCSE07
	4.	Bioinformatics	M19UCSE08

**SKILL ENHANCEMENT COURSES**

<b>Semester</b>	<b>Course Title</b>	<b>Course Code</b>
<b>III</b>	SEC-I – MS – Office	M19UCSS01
<b>IV</b>	SEC -II – Shell Programming	M19UCSS02
<b>V</b>	SEC -III – Open Source Technology	M19UCSS03
<b>VI</b>	SEC -IV – Perl Programming	M19UCSS04

**NON - MAJOR ELECTIVE COURSES: [FOR OTHER DEPARTMENTS]**

<b>Semester</b>	<b>Non-Major Elective Course</b>	<b>Course Code</b>
<b>III</b>	Fundamentals of Information Technology	M19NCS01
	Working Principles of Internet	M19NCS02
<b>IV</b>	Fundamentals of Web design	M19NCS03
	Programming in C	M19NCS04



#### 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. 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.

##### 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)
<b>Theory</b>	75	30	25	10	100	40
<b>Practical</b>	60	24	40	16	100	40
<b>Project</b>	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 examinations 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 an 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

<b>Core Course – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS01</b>	<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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 <sup>rd</sup> 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

<b>Core Course – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS02</b>	<b>PROGRAMMING IN C</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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	Analyze application using memory management functions.	K4
CO5	Apply the concepts to solve a real-time problem	K3

### UNIT I

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

### UNIT II

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

### UNIT III

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

### UNIT IV

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

### UNIT V

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

### Text Book

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

### Reference Books

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



## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
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

<b>Core Practical – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP01</b>	<b>PRACTICAL – I – PROGRAMMING IN C</b>	
<b>Credit: 2</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the mathematical functions while creating a program	K1
CO2	Understand the fundamental programming concepts	K2
CO3	Understand the programming technique to analyze software problems	K2
CO4	Apply the concepts to find solution for the problems	K3
CO5	Apply 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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
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

<b>Core Course – III</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS03</b>	<b>DATA STRUCTURES</b>	
<b>Credit: 4</b>		

### Objectives

To understand the concepts of Data Structures and Algorithms using Stack, Queue, Linked List and trees.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the algorithm concepts	K1
CO2	Understand the Arrays 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

<b>Core Course – IV</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS04</b>	<b>OBJECT ORIENTED PROGRAMMING WITH C++</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the role of inheritance, polymorphism, 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 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 Inheritance – 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 <sup>th</sup> Edition 2013

### Reference Books

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

## Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
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

<b>Core Practical – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP02</b>	<b>PRACTICAL – II – DATA STRUCTURES USING C++</b>	
<b>Credit: 2</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember 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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
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

<b>Core Course – V</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS05</b>	<b>RELATIONAL DATABASE MANAGEMENT</b>	
<b>Credit: 4</b>	<b>SYSTEMS</b>	

#### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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	Vijay Nicole Imprints Private Limited	2010
3.	Nilesh shah	simplified Guide To SQL and PL/SQL	PHI	2005

**Reference Book**

1. Database Management Systems Ramakrishnan, Gehrke McGraw Hill 2004

**Mapping with Programme Outcomes**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	M	S	M	S
<b>CO2</b>	S	M	M	S	S
<b>CO3</b>	M	S	M	S	S
<b>CO4</b>	S	S	S	M	S
<b>CO5</b>	S	M	S	M	M

**S**- Strong; **M**-Medium

### SEMESTER – III

<b>Core Practical – III</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP03</b>	<b>PRACTICAL – III – ORACLE</b>	
<b>Credit: 2</b>		

#### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>C01</b>	S	M	M	M	S
<b>C02</b>	M	S	S	S	M
<b>C03</b>	M	M	S	S	M
<b>C04</b>	M	S	M	S	S
<b>C05</b>	S	M	S	M	S

**S**- Strong; **M**-Medium

## SEMESTER – IV

<b>Core Course – VI</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS06</b>	<b>PROGRAMMING IN JAVA</b>	
<b>Credit: 4</b>		

### 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

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

### UNIT I

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

### UNIT II

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



### UNIT III

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

### UNIT IV

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

### UNIT V

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

### Text Book

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

### Reference Books

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

## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
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**

<b>Core Practical – IV</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP04</b>	<b>PRACTICAL – IV – PROGRAMMING IN JAVA</b>	
<b>Credit: 2</b>		

**Objectives**

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

**Course Outcomes**

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember about the operators	K1
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 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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
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

<b>Core Course – VII</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS07</b>	<b>WEB TECHNOLOGY</b>	
<b>Credit: 4</b>		

### 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

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

### Unit I

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

### Unit II

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

### Unit III

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

### Unit IV

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

### Unit V

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

#### Text Book

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

#### Reference Books

1.	Kogent Learning Solutions Inc	HTML5 Black Book	Prentice Hall PTR	Dreamtech Press
2.	Akanksha Rastogi	Web Technology	K.Nath & Co Educational Publishers	1 <sup>st</sup> 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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	S	M	S
<b>CO2</b>	S	M	S	S	M
<b>CO3</b>	M	S	M	M	S
<b>CO4</b>	S	M	S	S	M
<b>CO5</b>	M	S	M	S	S

**S**- Strong; **M**-Medium

## SEMESTER - V

<b>Core Course – VIII</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS08</b>	<b>.NET PROGRAMMING</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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)	MGH	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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	M	S	S
<b>CO2</b>	S	M	M	S	M
<b>CO3</b>	M	S	M	S	S
<b>CO4</b>	S	M	S	M	S
<b>CO5</b>	M	S	M	S	M

**S**- Strong; **M**-Medium

## SEMESTER V

<b>Core Course – IX</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS09</b>	<b>DATA COMMUNICATION AND NETWORKING</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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 <sup>th</sup> 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
C01	S	M	M	S	S
C02	M	S	S	M	M
C03	M	S	M	S	S
C04	S	M	S	M	M
C05	S	M	M	S	S

**S-** Strong; **M-**Medium

## SEMESTER V

<b>Core Course – X</b>	<b>B.Sc Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS10</b>	<b>OPERATING SYSTEMS</b>	
<b>Credit: 4</b>		

### Objectives

To provide the Fundamental Concepts of Operating System.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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 <sup>th</sup> 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 V

<b>Core Practical – V</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP05</b>	<b>PRACTICAL – V – WEB TECHNOLOGY</b>	
<b>Credit: 2</b>		

### 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

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

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

## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	S	M	S
<b>CO2</b>	S	M	S	S	M
<b>CO3</b>	M	S	M	M	S
<b>CO4</b>	S	S	M	S	M
<b>CO5</b>	S	S	S	M	S

**S**- Strong; **M**-Medium



## SEMESTER - V

<b>Core Practical – VI</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP06</b>	<b>PRACTICAL – VI – .NET PROGRAMMING</b>	
<b>Credit: 2</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	M	S	S
<b>CO2</b>	S	M	S	M	S
<b>CO3</b>	M	S	M	S	M
<b>CO4</b>	S	M	S	M	S
<b>CO5</b>	M	S	S	S	M

**S**- Strong; **M**-Medium

## SEMESTER VI

<b>Core Course – XI</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS11</b>	<b>PYTHON PROGRAMMING</b>	
<b>Credit: 4</b>		

### Objectives

To understand the concepts of Python Programming

### Course Outcomes

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

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

### UNIT I

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

### 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 <sup>th</sup> Edition

### Reference Book

1.	Wesley J. Chun	Core Python Programming	Prentice Hall.	2 <sup>th</sup> Edition
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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

<b>Core Course – XII</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS12</b>	<b>DATA MINING</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge level</b>
CO1	Remember the data mining techniques	K1
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 <sup>rd</sup> 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

<b>Core Course – XIII</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS13</b>	<b>MOBILE COMPUTING</b>	
<b>Credit: 4</b>		

### 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

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

### UNIT I

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

### UNIT II

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

### UNIT III

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

### UNIT IV

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

### UNIT V

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

#### Text Book

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

#### Reference Books

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

### Mapping with Programme Outcomes

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

**S-Strong; M-Medium**



## SEMESTER VI

<b>Core Course – XIV</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCS14</b>	<b>SOFTWARE ENGINEERING</b>	
<b>Credit: 4</b>		

### 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

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

### UNIT I

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

### UNIT II

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

Software Design - Cohesion and Coupling - Neat Arrangement - Software Design Approaches.

### UNIT III

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

### UNIT IV

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

### UNIT V

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

### Text Book

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

### Reference Book

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

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	M	S	M	S	S
<b>CO3</b>	M	S	M	S	M
<b>CO4</b>	S	M	S	M	S
<b>CO5</b>	M	S	M	S	M

**S-Strong; M-Medium**

## SEMESTER VI

<b>Core Practical – VII</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M16UCSP07</b>	<b>PRACTICAL VII – PYTHON PROGRAMMING</b>	
<b>Credit: 2</b>		

### Objectives

To understand the concepts of Python Programming

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	S	S	M	S	M
<b>CO3</b>	M	S	S	M	S
<b>CO4</b>	S	M	M	S	S
<b>CO5</b>	M	S	S	M	M

**S**- Strong; **M**-Medium

## SEMESTER - VI

<b>Core Practical – VIII</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSP08</b>	<b>PRACTICAL – VIII – DATA MINING USING</b>	
<b>Credit: 2</b>	<b>RAPID MINER</b>	

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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 try 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 Rapidminer.

## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>C01</b>	M	S	M	S	M
<b>C02</b>	S	M	S	M	S
<b>C03</b>	M	S	M	S	M
<b>C04</b>	M	S	S	M	S
<b>C05</b>	S	M	S	S	M

**S**- Strong; **M**-Medium

# **ALLIED SUBJECTS**



## SEMESTER - I

<b>Allied – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UMAA01</b>	<b>ALLIED – I – MATHEMATICS – I –</b>	
<b>Credit: 4</b>	<b>ALGEBRA, INTEGRAL CALCULUS AND FOURIER SERIES</b>	

### Objectives

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

### Course Outcomes

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

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

### Unit I

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

### Unit II

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

### Unit III

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

### Unit IV

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

### Unit V

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

#### Text Books

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

#### Reference Books

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

## Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	M	M	M	M
<b>CO2</b>	S	S	S	M	S
<b>CO3</b>	M	S	S	M	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	S	M	S

**S**- Strong; **M**-Medium

## SEMESTER - II

<b>Allied – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UMAA02</b>	<b>ALLIED – II – MATHEMATICS – II – DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS</b>	
<b>Credit: 4</b>		

### Objectives

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

### Course Outcomes

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

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

### Unit I

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

## Unit II

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

## Unit III

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

## Unit IV

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

## Unit V

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

### Text Books

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

### Reference Books

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

## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>C01</b>	M	M	M	M	M
<b>C02</b>	S	S	S	M	S
<b>C03</b>	M	S	S	M	M
<b>C04</b>	M	S	S	M	S
<b>C05</b>	S	S	S	M	S

**S**- Strong; **M**-Medium

### SEMESTER - III

<b>Allied – III</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UPHA01</b>	<b>ALLIED – III – APPLIED ELECTRONICS</b>	
<b>Credit: 4</b>		

#### Objectives

This course presents the principles of Arithmetic circuits with flip flop's and registers. It also includes the counters, non-sinusoidal oscillators and operational amplifiers.

#### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Understand the concepts of Half adder-Full adder	K2
CO2	Remember to design RS FLIP FLOP using NOR and NAND gates	K1
CO3	Apply the Counters with 2R binary ladder method	K3
CO4	Understand the Classification of non sinusoidal oscillators	K2
CO5	Analyze to design the Operational Amplifiers	K4

#### UNIT I

Binary, Octal, Hexadecimal - interconversion - Gray code - excess 3-code - ASCII code - basic gates - Demorgan's theorem - universal gates.

#### UNIT II

Laws of Boolean algebra - solving Boolean expression - K-map- minterms - SOP - K-map simplification using minterm (2, 3 and 4 variables) - POS - K-map simplification using max terms (2, 3 and 4 variables) - incomplete specified functions.

#### Unit III

Types of DC machines - DC generators - emf equation - Open circuit and load characteristics of different types of DC generators - DC motors - Principle of operation - Types - Torque equation -Characteristics – Starters.

#### Unit IV

Principle of operation - emf equation - Phasor diagram - Equivalent circuit - OC and SC tests – Basic principles of auto transformer and three phase transformer

#### Unit V

Principle of Indicating instruments- moving coil, moving iron and dynamometer type instruments Extension of range of voltmeter and ammeter - Measurement of 3 phase power by two wattmeter method – Principle and working of Induction type energy meter- DC slide wire, potentiometer – Wheat stone bridge - Kelvin's double bridge - AC bridges - Schering bridge, Maxwell's bridge

#### Text Books

S.No	Author	Title of the Book	Publisher	Year of Publication
1.	Malvino and Leach	Digital principles and applications	TMH	
2.	Vijayendran, S. Viswanathan	Digital fundamentals	Printers and Publishers Pvt. Ltd	
3.	Virendra Kumar	Digital electronics	New Age International Publishers	
4	V.K.Metha	Fundamentals of Electronics	S.CHAND Publications	
5	Mathur	Fundamentals of Electronics	S.CHAND Publications	

#### Mapping with Programme Outcomes

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

**S**- Strong; **M**-Medium



### SEMESTER - III

<b>Allied Practical – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UPHAP01</b>	<b>ALLIED PRACTICAL – I –BASIC ELECTRONICS – I</b>	
<b>Credit: 2</b>		

#### Objectives

To understand the concepts of Gates and its operations.

#### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the basic operators	K1
CO2	Understanding the Logic Gates	K2
CO3	Applying Arithmetic Operations	K3
CO4	Analyzing the Half and full adder	K4
CO5	Apply the concept of Seven segment display	K3

1. Verify the truth tables of OR, AND, NOT, NAND, NOR and EX-OR Gates.
2. Construct NOT, NOR, OR, AND, EX-OR Gates using NAND gates.
3. Construct NOT, NOR, OR, AND, EX-OR Gates using NOR gates.
4. Verify Demorgan's theorem using suitable IC's.
5. Draw the characteristic curves for given JFET & find the parameters of JFET.
6. Construct the 4 bit binary added and subtraction using IC 7483 and IC7486 verify their truth table.
7. Construct the half adder and full adder and to verify their truth tables.
8. Determine the characteristics of uni junction transistor.
9. Construct the BCD binary number to decimal number by seven segments.
10. Construct shift resistor, ring counter and ring counter using IC-7473.

## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	S	S	M	S	M
<b>CO3</b>	M	S	S	M	S
<b>CO4</b>	S	M	M	S	S
<b>CO5</b>	M	S	S	M	M

**S**- Strong; **M**-Medium

## SEMESTER - IV

<b>Allied – IV</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UPHA02</b>	<b>ALLIED – IV – ADVANCED ELECTRONICS</b>	
<b>Credit: 4</b>		

### Objectives

This course presents the principles of Arithmetic circuits with flip flop's and registers. It also includes the counters, non-sinusoidal oscillators and operational amplifiers.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Understand the concepts of Half adder-Full adder	K2
CO2	Remember to design RS FLIP FLOP using NOR and NAND gates	K1
CO3	Apply the Counters with 2R binary ladder method	K3
CO4	Understand the Classification of non sinusoidal oscillators	K2
CO5	Analyze to design the Operational Amplifiers	K4

### UNIT: I Arithmetic Circuits

Introduction-Half adder-Full adder-Half subtractor-Full subtractor-Decoder-BCD to seven segment decoder-Encoder-Decimal to BCD encoder-multiplexer-applications-demultiplexer

### UNIT: II Flip Flop's And Registers

Introduction-RS FLIP FLOP using NOR and NAND gates-clocked RS flip flop -D flip flop-JK flip flop- Master Slave JK flip flop-Registers-Shift Registers (Right to left and left to right)-applications

### UNIT: III Counters

Introduction-Counters-modulus of a counter-asynchronous counter-synchronous counter-BCD counter-D/A conversion-R-2R binary ladder method-A/D conversion-successive approximation

#### **UNIT: IV Non-sinusoidal Oscillators**

Introduction-Classification of nonsinusoidal oscillators-Multivibrators-Astable multivibrator- Monostable multivibrator -Bistable multivibrator-Applications of Multivibrators-Schmitt Trigger

#### **UNIT: V Operational Amplifiers**

Introduction-Operational overview-Op-amp parameters-Inverting amplifier-Non-inverting amplifier-Summing amplifier-Differential amplifier-Op-amp applications-Integrator -Differentiator-Opamp based Wein-bridge oscillator-Square wave Relaxation Oscillator.

#### **Text Books**

<b>S.No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
1.	B.R. Gupta and V. Singhal	Digital electronics	S.K.Kataria & Sons Publishers.	
2.	R.S. Sedha	Applied Electronics	S. Chand & Company Ltd	
3.	Malvino and Leach	Digital principles and applications	TMH.	
4.	Vijayendran, S. Viswanathan	Digital fundamentals	S. Viswanathan Printers and Publishers Pvt. Ltd	
5.	Virendra Kumar	Digital electronics	New Age International Publishers	

### Reference Books

S.No	Author	Title of the Book	Publisher	Year of Publication
1.	Avinash Kapoor	Digital electronics	Krishna PrakasanMandhir, 9, Shivaji Road, Meerut (UP).	1994
2.	Maheswari	Principles and Practice of electronics	Emerald Publishers, 135, Anna Salai, Chennai – 600002.	1988
3.	A. P. Godse	Digital electronics	Technical Publsher, Pune	
4.	Morris Mano	Digital Logic and Computer Design	PHI	

### Mapping with Programme Outcomes

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

**S-** Strong; **M-**Medium

**SEMESTER - IV**

<b>Allied Practical – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UPHAP02</b>	<b>ALLIED PRACTICAL – II – BASIC ELECTRONICS – II</b>	
<b>Credit: 2</b>		

**Objectives**

To understand the Advanced concepts using flip flops, Encode, decoders.

**Course Outcomes**

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the basic operations of multiplexer	K1
CO2	Understanding the concept of flip flop	K2
CO3	Applying subtractor concepts	K3
CO4	Analyzing the amplifiers.	K4
CO5	Apply the concept of analog convertor	K3

1. Multiplexer & de- Multiplexer.
2. Encoder & decoder.
3. Flip flop using gates.
4. Half –subtractor & full–subtractor.
5. UJT characteristic.
6. Astable multivibrator using 555 timer
7. Operational amplifier adder and subtractor.
8. Digital to analog convertor binary weighted method.

**Mapping with Programme Outcomes**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	S	S	M	S	M
<b>CO3</b>	M	S	S	M	S
<b>CO4</b>	S	M	M	S	S
<b>CO5</b>	M	S	S	M	M

**S-** Strong; **M-**Medium

# **ELECTIVE SUBJECTS**

## SEMESTER V

<b>Elective – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE01</b>	<b>COMPILER DESIGN</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the compiler design analysis of source program	K1
CO2	Analyze the role of parser top down and Bottom up parsing	K4
CO3	Understand the intermediate languages	K2
CO4	Understand the concepts of code generator representation of basic blocks	K2
CO5	Apply the concepts of principles of optimization	K3

### UNIT I

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

### UNIT II

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

### UNIT III

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



#### UNIT IV

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

#### UNIT V

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

#### Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Alfred Aho, Ravi Sethi, Jeffrey D Ullman	Compiler principles, techniques and tools	Pearson education Asia	2003

#### Reference Books

1.	Allen I. Holub	Compiler Design in C	Prentice hall of India	2003
2.	Fischer.C.N and LeBlanc.R.J	Crafting a compiler with C	Prentice hall of India	2003
3.	Bennet.J.P	Introduction to Compiler Techniques	Tata MC Graw-Hill	2003

#### Mapping with Programme Outcomes

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

**S-** Strong; **M-**Medium

## SEMESTER V

<b>Elective – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE02</b>	<b>ARTIFICIAL INTELLIGENCE</b>	
<b>Credit: 4</b>		

### Objectives

This course introduces the basic principle concepts in artificial intelligence like simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. It also covers the areas of application such as knowledge representation, natural language processing and expert systems.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the artificial intelligence problem and The characteristics of the problem space.	K1
CO2	Understand the fundamentals of heuristic search Techniques and reasoning for problem solving.	K2
CO3	Understand the problem solving using predicates.	K2
CO4	Analyze the concepts of expert systems with case Studies for game playing various applications.	K2
CO5	Apply the concepts of various application techniques.	K3

### UNIT I

**Artificial intelligence meaning:** The AI problems – The underlying assumption – What is an AI Techniques? – The level of the model. Problems, problem spaces, and search: Defining the system – problem characteristics – production system characteristics.

### UNIT II

**Heuristic search techniques:** Generate and Test – Hill climbing – Best –first search – Problem reduction – Constraint satisfaction – Means –ends analysis. Knowledge representation issues: Representations and mappings – Approaches to knowledge representation.

### UNIT III

**Using predicate logic:** Representing simple facts in logic – Representing instance and ISA relationships – computable functions and predicates resolution – natural deduction. Representing Knowledge using rules: Procedural versus declarative knowledge – Logic programming – Forward versus Backward reasoning – Matching – Control Knowledge.

### UNIT IV

**Game playing:** Overview – The mini max search procedure – Adding alpha – beta cut-offs – Additional refinements – Iterative Deepening – References on specific games. Understanding: What understands? What makes understanding hard? Planning- The blocks world- components of a planning system –Good stack planning-Coral Stack planning-Nom linear planning using constraint posting.

### UNIT V

**Natural language processing:** Introduction-Syntactic processing-Semantic analysis. Learning: Rote learning-Learning in problem solving-Explanation based learning. Connectionist models: Hopfield networks-Learning in Neural networks-Applications of neural networks-Recurrent networks.

#### Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Elaine rich, Kevin Knight, Shivashankar B Nair	Artificial Intelligence	Tata McGraw Hill	3 <sup>rd</sup> Edition, 2011

#### Reference Books

1.	Stuart Russell	Artificial Intelligence: A Modern Approach	Pearson	3 <sup>rd</sup> Edition, 2013
2.	Deepak Khemani	A First Course in Artificial Intelligence	McGraw Hill	2013
3.	Mishra R. B.	Artificial Intelligence	Prentice Hall of India	2010

## Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	S	M	M	S	M
CO2	M	S	S	M	M
CO3	S	M	M	S	S
CO4	M	S	S	M	S
CO5	S	S	M	S	M

**S**- Strong; **M**-Medium

## SEMESTER V

<b>ELECTIVE – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE03</b>	<b>DISTRIBUTED COMPUTING</b>	
<b>Credit: 4</b>		

### Objectives

This course provides students basic knowledge and skills on the Resource sharing. This course covers Remote invocation, Distributed file system, shared memory, transaction and resource management.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Identify the nature of shared resources and network management	K1
CO2	Understand the foundations of distributed systems.	K2
CO3	Analyze system level and support required for distributed system.	K4
CO4	Develop design process and resource management systems.	K3
CO5	Apply remote method invocation and network virtualization.	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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>C01</b>	M	M	S	S	S
<b>C02</b>	S	M	M	S	S
<b>C03</b>	M	S	M	S	S
<b>C04</b>	S	S	S	M	S
<b>C05</b>	S	M	S	M	M

**S**- Strong; **M**-Medium

## SEMESTER V

<b>Elective – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE04</b>	<b>RUBY ON RAILS</b>	
<b>Credit: 4</b>		

### Objectives

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

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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 Understanding the databases.	K3
CO4	Analyze the concepts of Scaffolding and rest.	K4
CO5	Apply the concepts of Forms and cookies in various applications.	K3

### UNIT I

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

### UNIT II

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



### UNIT III

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

### UNIT IV

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

### UNIT V

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

#### Text Book

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

#### Reference Book

1.	Barry bud	Ruby on Rails for Dummies	Wiley publishing	2007
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#### Mapping with Programme Outcomes

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

**S-** Strong; **M-**Medium

## SEMESTER VI

<b>ELECTIVE – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE05</b>	<b>NETWORK SECURITY</b>	
<b>Credit: 4</b>		

### Objectives

This course presents the principles of cryptography and Network Security. It also includes the classical and advanced encryption standards and techniques, message authentication codes, digital signatures, email security, IP security, web security, firewalls and Mobile Network Security.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the OSI Security Architecture and Encryption Techniques	K1
CO2	Apply the principles of block ciphers and DES	K3
CO3	Analyze the Key management and Cryptosystems	K4
CO4	Understand the concepts of digital signatures and authentication protocols	K2
CO5	Remember to design the IP security and Web security	K1

### UNIT I

**Introduction:** Security Trends - The OSI Security Architecture – Security Attacks – Security Services - A model for Internetwork Security. Classical Encryption Techniques: Symmetric Cipher Model - Substitution Techniques -Transposition Techniques – Steganography

### UNIT II

**Block Ciphers and the DES:** Block cipher Principles - The DES - The Strength of DES - Differential and Linear Crypt Analysis. Advanced Encryption Standard: Evaluation Criteria for AES - The AES Cipher. **Public key cryptography and RSA:** Principles of Public – Key Cryptosystems – The RSA Algorithm

### UNIT III

**Key management Other Public Key Cryptosystems:** Diffie-Hellman Key exchange – Elliptic Curve Arithmetic - Elliptic Curve Cryptography. Message Authentication and Hash Functions: Authentication Requirements - Authentication Functions - Security of Hash Functions and MACs

#### UNIT IV

**Digital Signatures and Authentication Protocols:** Digital Signatures - Authentication Protocols - Digital Signature Standard. Authentication Applications: Kerberos - X.509 Authentication Service, Public-Key Infrastructure. Email Security: Pretty Good Privacy - S/MIME

#### UNIT V

**IP Security:** IP Security Overview - IP Security Architecture - Authentication Header - Encapsulating Security Payload. Web Security: Security Considerations - SSL and TLS-SET. System Security: Intruders – Intrusion Detection – Password Management. **Malicious Software:** Viruses and Related Threats. Firewalls: Design Principles - Trusted systems

#### Text Book

S.No	Author	Title of the book	Publisher	year of publication
1	William Stallings	Cryptography and Network Security - Principles and Practices	Prentice Hall of India	Fourth Edition 2007

#### Reference Books

1.	AtulKahate	Cryptography and Network Security	Tata McGraw Hill, New Delhi	Second Edition 2006
2.	Charles P Pfleeger, Shari Lawrence P Pfleeger	Security in Computing	Pearson education, New Delhi	2006

## Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	M	S	M	S	M
CO2	S	S	M	M	S
CO3	S	M	S	M	M
CO4	M	S	S	M	S
CO5	S	S	M	S	M

S- Strong; M-Medium

## SEMESTER VI

<b>ELECTIVE – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE06</b>	<b>CLOUD COMPUTING</b>	
<b>Credit: 4</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
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	Publisher	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

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>C01</b>	M	M	S	S	S
<b>C02</b>	S	M	M	S	S
<b>C03</b>	M	S	M	S	S
<b>C04</b>	S	S	S	M	S
<b>C05</b>	S	M	S	M	M

**S**- Strong; **M**-Medium

## SEMESTER VI

<b>ELECTIVE – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE07</b>	<b>MULTIMEDIA SYSTEMS</b>	
<b>Credit: 4</b>		

### Objectives

This course presents the principles of Multimedia systems and its applications. It also includes the Multimedia software and authoring tools, Multimedia building blocks, multimedia image and video and the internet.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Understand the concepts of multimedia and training skills	K2
CO2	Apply the basic software tools in multimedia	K3
CO3	Remember to design the fonts using text in multimedia	K1
CO4	Understand the principle of animations	K2
CO5	Analyze the concept of multimedia and the internet	K4

### UNIT –I

**Introduction to Multimedia:** Definitions – Where to use of Multimedia – Multimedia and Training skills – Multimedia hardware – Hardware Peripherals - Macintosh and Windows production platforms – Connections – Memory and storage devices – Input devices – Output devices – Communication devices.

### UNIT – II

**Multimedia software and Authoring tools :** Basic software tools – Text editing and word processing tools– Painting and drawing tools – 3-D modeling and animation tools – Image editing tools –sound editing tools Animation, video and digital movie tools – Making instant multimedia – Multimedia authoring tools.



### **UNIT – III**

**Multimedia Building Blocks:** Text – Fonts and Faces – Using Text in Multimedia –Computers and Text – Font editing and Design tools – Hypermedia and Hypertext –Sound – Multimedia System Sounds – MIDI versus Digital Audio – Digital Audio – Making MIDI Audio – Audio File Formats.

### **UNIT – IV**

**Multimedia Images and Video:** Images – Making still Images – Color – Image file formats – Animation – Principle of Animation – Making Animations that Work – Video – How Video Works – Integrating Video – Video – Video tips –Recording formats – Digital video.

### **UNIT –V**

**Multimedia and the Internet:** The Internet and How it Works – Internetworking – Connections – Internet services – The World Wide Web and HTML – Dynamic WebPages – Multimedia on the Web – Tools for the World Wide Web – Web Services – Web Browsers – Plug-ins and Delivery Vehicles – 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**

<b>S.No</b>	<b>Author</b>	<b>Title of the book</b>	<b>Publisher</b>	<b>Year of publication</b>
1	Tay Vaughan	Multimedia Making It Work	TataMcGraw Edition	HillFifth Edition 2011

### **Reference Books**

1. James E.Shuman      Multimedia in Action      Vikas Publishing House      Second Edition 2006
2. John Villamil – Casanova, Louis Moliva      – Multimedia an Introduction      PHI

## Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	S	M	S	M	S
CO2	M	S	M	S	M
CO3	S	M	S	M	M
CO4	M	S	S	M	S
CO5	S	S	M	S	M

**S**- Strong; **M**-Medium

**SEMESTER VI**

<b>ELECTIVE – II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSE08</b>	<b>BIOINFORMATICS</b>	
<b>Credit: 4</b>		

**Objectives**

By studying this course the students will get an idea about the basic understanding about Bioinformatics, tools, sequences, algorithms and the analysis of phylogenetic tree.

**Course Outcomes**

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the basics of Bioinformatics	K1
CO2	Understand the concept of sequences	K2
CO3	Analyze the tools of content	K3
CO4	Apply the idea related dynamic programming	K4
CO5	Apply the model of Phylogenetic Analysis	K4

**Unit I**

**Basic Bioinformatics:** The knowledge of databases and bioinformatics tools available at these resources. Organization of databases: data contents, purpose and utility. Algorithms; asymptotic analysis of algorithms.

**Unit II**

**Methods of Sequences:** Basic concepts of sequence similarity, identity and homology, definitions of homologues, orthologues, paralogues. Introduction to PAM and BLOSUM matrices; basic concept of a scoring matrix, matrices for nucleic.

**Unit III**

**Tools:** Collecting and storing sequences. Various file formats for bio-molecular sequences: GenBank, FASTA, GCG, MSF, NBRF-PIR etc. Database searching: Using BLAST, FASTA and other sequences.

## Unit IV

### **Dynamic Programming Algorithm: Sequence patterns and profiles:**

Basic concept and definition of sequence patterns, motifs and profiles, various types of pattern representations viz. consensus, regular expressions.

## Unit V

### **Phylogenetic Analysis:** Phylogenetic tree, Neighbour joining, UPGMA.

Use of Hidden Markov model (HMM) in assigning homology. Advantages and disadvantages of various sequence analysis methods.

### **Text Books**

<b>S.No</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
1.	J. M.Keith	Data, sequence analysis & evolution.	Vol. 1: Humana Press.	2008
1.	R. Durbin.	Biological sequence analysis	Cambridge University Press.	1998

### **Reference Books**

1.	Teresa K. Attwood, David J. Parry – Smith	Introduction to bioinformatics	Pearson Education.	4 <sup>th</sup> Edition- 1999
2.	M. Holmes	A Cell Biologists' guide to modeling and Bioinformatics	Wiley Inter Science.	2007
3.	R.C. Elston, W.D. Johnson	Basic biostatistics for geneticists & epidemiologists – A practical approach	Jhon Wiley & Sons Pvt. Ltd.	2008
4.	P. R. Bevington	Data reduction and error analysis for the physical sciences	McGraw Hill.	1969

### **Mapping with Programme Outcomes**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	M	S	M	S
<b>CO2</b>	M	M	M	S	M
<b>CO3</b>	M	M	M	M	S
<b>CO4</b>	S	S	M	M	M
<b>CO5</b>	S	S	M	M	M

**S-** Strong; **M**-Medium

# **SKILL ENHANCEMENT COURSES**

## SEMESTER III

<b>SEC - I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSS01</b>	<b>SEC - I - MS-OFFICE</b>	
<b>Credit: 2</b>		

### Preamble

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

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

### UNIT-I

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

### UNIT-II

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

### UNIT- III

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

### UNIT-IV

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

## UNIT- V

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

### Text Book

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

### Reference Books

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

### Mapping with Programme Outcomes

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

**S** - Strong; **M** - Medium

## SEMESTER IV

<b>SEC - II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSS02</b>	<b>SEC - II - SHELL PROGRAMMING</b>	
<b>Credit: 2</b>		

### Preamble

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

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

### UNIT I

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

### UNIT II

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

### UNIT III

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



#### UNIT IV

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

#### UNIT V

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

#### Text Book

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

#### Reference Book

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

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

**S-** Strong; **M-**Medium

## SEMESTER V

<b>SEC – III</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSS03</b>	<b>SEC – III – OPEN SOURCE TECHNOLOGY</b>	
<b>Credit: 2</b>		

### 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

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

### UNIT-I

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

### UNIT-II

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

### UNIT-III

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

#### UNIT-IV

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

#### UNIT-V

**Date and Time Functions:** data, data\_default\_timezone\_set, strtotime, mktime. **Handling Files:** create- fopen - fread - fwrite - include - fclose - unlink - fgets - fgetc - feof - require-require\_once.

#### Text Book

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

<b>SEC – IV</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UCSS04</b>	<b>SEC – IV – PERL PROGRAMMING</b>	
<b>Credit: 2</b>		

### 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

<b>CO</b>	<b>Statement</b>	<b>Knowledge level</b>
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

**NON - MAJOR ELECTIVE COURSES  
[FOR OTHER DEPARTMENTS]**

### SEMESTER III

<b>NMEC - I</b>	<b>OTHER DEPARTMENTS</b>	<b>2019 - 2020</b>
<b>M19NCS01</b>	<b>FUNDAMENTALS OF INFORMATION TECHNOLOGY</b>	
<b>Credit: 2</b>		

#### Objectives

This course introduces the basic principle concepts in artificial intelligence like simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. It also covers the areas of application such as knowledge representation, natural language processing and expert systems.

#### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the introduction of computers.	K1
CO2	Understand the input and output memory units.	K2
CO3	Analyze the basics of operating system.	K3
CO4	Analyze the concepts of internet.	K3
CO5	Apply the concepts of computer security.	K4

#### UNIT I

Introduction to Computers - Generation of Computers - Classification of Digital Computer - Components of computer- Anatomy of Digital Computer- Categories of computer.

#### UNIT II

CPU and Memory: Types of memory (RAM and ROM) - Secondary Storage Devices - Input Devices: (Keyboard, Mouse, Joystick, Trackball, Scanner). Output Devices: (Monitor, Printer, Plotter, Sound cards & Speakers)

### UNIT III

Introduction to Computer Software - Programming Language - Operating Systems- Operating system functions-Types of operating system - Introduction to Database Management System.

### UNIT IV

Computer Networks: Introduction- Evaluation of computer networks-Classification of computer networks-components of computer networks - WWW and Internet- History of Internet- How the internet works - www- Email - Web Design.

### UNIT V

Computers at Home, Education, Entertainment, Science, Medicine and Engineering - Introduction to Computer Security - Computer Viruses, Bombs, Worms- Computer security risks.

#### Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1	Alexis Leon And Mathews Leon	Fundamentals of Information Technology	Vikas publications	2009

#### Reference Book

1.	M.N Doja	Fundamentals of Computers and Information Technology	Pearson	2005
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#### Mapping with Programme Outcomes

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

**S-** Strong; **M-**Medium



### SEMESTER III

<b>NMEC – I</b>	<b>OTHER DEPARTMENTS</b>	<b>2019 - 2020</b>
<b>M19NCS02</b>	<b>WORKING PRINCIPLES OF INTERNET</b>	
<b>Credit: 2</b>		

#### Objectives

This course introduces to understand the basic concept of internets. It covers concepts such as Email, internet chat, web pages.

#### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the basic concept of internets	K1
CO2	Understand familiar with the concept of Emails and instant messaging	K2
CO3	Apply the basic of WWW and Common internet tools	K4
CO4	Analyze the be exposed Multimedia and Animation on the internet	K3
CO5	Analyze and gain knowledge about protecting yourself on the internet	K3

#### UNIT I

**Understanding The Internet's Underlying Architecture:** what is Internet?-How computer networks send Data across the internet-How TCP/IP works- Understanding the internet software structure- How internet addresses and domains work- How routers work.

#### UNIT II

**Connecting to the Internet:** How computers connect to the internet-How internet /Television connections work-Working with wireless connections and Wi-Fi- Home networks. **Communicating on the internet:** E-mail – E-mail spam-Newsgroup work-Internet chat and instant messaging- Skype and VoIP-Blogging and RSS.

#### UNIT III

**World Wide Web:** Web pages-Web browsers-Markup Languages-Hypertext –URL-Image maps and interactive forms-Web host servers-.net and web services-Grid computing. **Common internet tools:** Telnet-FTP-Java, ActiveX and Java script-CGI scripting.

#### UNIT IV

**Multimedia on the Internet:** Music and Audio works on the internet- iPods, iTunes and podcasting-Music sharing and file sharing- Multicast IP- Virtual Reality- Animation. **Shopping on the Internet:** Intranets-Online Buying-Online shopping carts-eBay sells everything.

#### UNIT V

**Protecting your self on the Internet:** Firewalls-Hackers can cripple the internet and attack your PC- Wireless networking- Viruses – Internet sites can invade your privacy-Spyware and phishing- Cryptography, privacy and digital certificates.

#### Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Michael Troller, Preston Gralla	How the internet works	Que	2006

#### Reference Book

1.	Alexis Leon, S. Chand	Internet for Everyone	Vikas	2 <sup>nd</sup> Edition 2012
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#### Mapping with Programme Outcomes

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

**S-** Strong; **M-**Medium

## SEMESTER IV

<b>NMEC – II</b>	<b>OTHER DEPARTMENTS</b>	<b>2019 - 2020</b>
<b>M19NCS03</b>	<b>FUNDAMENTALS OF WEB DESIGN</b>	
<b>Credit: 2</b>		

### Objectives

This course presents the basic concepts of web design and comprehends the technologies for Hypertext Mark-up Language (HTML).

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Remember the concepts of basic text formatting	K1
CO2	Understand fundamentals tools and technologies for web design.	K2
CO3	Analyze the current topics in Web tools	K3
CO4	Apply sample web pages and sites.	K4
CO5	Analyze creating tables	K3

### UNIT I

**HTML Basics – Setting up the Document Structure:** Creating the HTML, Head and Body Sections-Creating Paragraphs and Line Breaks – Specifying a Page Title and Metatags. **Formatting Text by using Tags:** Creating Headings- Applying Bold and Italic Formatting-Applying Superscript and Subscript Formatting – Formatting a blockQuotation.

### UNIT II

**Using Lists and Backgrounds:** Creating Bulleted and Numbered Lists – Creating Definition Lists-Inserting Special Characters –Inserting Horizontal Lines – Choosing Background and Foreground Colors-Specifying a Background Image File. **Creating Hyperlinks and Anchors:** Hyper linking to a Web Page – Hyper linking to an E-mail Address- Creating and Hyper linking to Anchors.

### UNIT III

**Introduction to Style Sheets:** Understanding Styles-Constructing Style Rules-Creating Styles for Nested Tags-Creating Classes and IDs for Applying Styles-Apply Styles to Hyper links- Creating and Linking to External Style Sheets.

#### UNIT IV

**Formatting Text by using Style Sheets:** Specifying a Font Family- Specifying Font Size and Colour- Applying Bold and Italic-Applying Strikethrough and Underlining- Creating Line Spans- Adjusting Spacing between Letters.

#### UNIT V

**Formatting Paragraphs by using Style Sheets:** Indenting Paragraphs-Applying a Border to a Paragraph-Specifying the Horizontal Alignment of a Paragraph –Specifying Vertical Space within a Paragraph.  
**Creating Tables:** Creating a Simple Table – Specifying the Size of a Table – Specifying the Width of a Column – Merging Table Cells – Using Tables for Page Layout.

#### Text Book

S.No	Author	Title of book	Publisher	Year of publication
1.	Faithe Wempen	Step by Step HTML5	Microsoft Press Prentice Hall of India	2008

#### Reference Book

1.	Chuck Musciano & Bill Kennedy	HTML – The Definitive Guide	Shroff Publishers	2009
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#### Mapping with Programme Outcomes

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

**S-** Strong; **M-**Medium

## SEMESTER IV

<b>NMEC – II</b>	<b>OTHER DEPARTMENTS</b>	<b>2019 - 2020</b>
<b>M19NCS04</b>	<b>PROGRAMMING IN C</b>	
<b>Credit: 2</b>		

### Objectives

This course introduces the student to gain knowledge on various services of programming in C. It also presents various sample programs.

### Course Outcomes

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

<b>CO</b>	<b>Statement</b>	<b>Knowledge Level</b>
CO1	Understand the basic concepts of C language	K2
CO2	Apply different types of decision making statements in c program	K3
CO3	Remember different types of String handling function	K1
CO4	Analyze different kinds of Arrays and functions	K4
CO5	Apply various concepts in C program	K3

### UNIT I

**Overview of C:** History of C – Basic structure of C programs. Character Set - C Tokens – Keywords and identifiers – Constants – Variables-Declaring of Variables-Assigning Values to Variables – Data types – Operators - **Managing Input and Output Operations:** Reading a Character - Writing a Character -Formatted Input-Formatted Output.

### UNIT II

**Decision Making and Branching:** Simple IF, IF-ELSE, Nesting of IF-ELSE, ELSE-IF ladder, Switch statements – GOTO statements. **Decision Making and Looping:** WHILE statement – DO statement – FOR statement – Jumps in loops.

### UNIT III

**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

**Arrays:** Definition - Declaration of arrays- Initialization of arrays- One dimensional arrays - Two dimensional arrays – Multi Dimensional Arrays.  
**User-Defined functions:** Introduction – Defining a function - Return values and their types – Function calls – Function declaration – All category of functions – Recursion.

## UNIT V

Simple program using - Operators - IF statement – Nested if Statement – Switch Statements - FOR loop – While loop – Do- While loop-String handling Functions - Arrays - Recursion.

### Text Book

S.No.	Author	Title of Book	Publisher	Year of Publication
1.	E. Balagurusamy	Programming in C	Tata McGraw Hill	6th Edition

### Reference Books

1.	Yashavant Kanetkar	Let Us C	BPB Publications	13 <sup>th</sup> Edition
2.	D. Ravichandran	Programming in ANSI C	NewAge International (P) Ltd	11 <sup>th</sup> Edition

### Mapping with Programme Outcomes

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

**S- Strong; M-Medium**

## **ENHANCEMENT COMPULSORY COURSES**

## SEMESTER - I

<b>ECC – I</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UVE01</b>	<b>VALUE EDUCATION – YOGA</b>	
<b>Credit: 2</b>		

### Objectives

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

### Course Outcomes

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

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

#### பாடநோக்கம்

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

#### அலகு 1

யோகமும் உடல்நலமும் உடலமைப்பு – எளியமுறை உடற்பயிற்சி – மகராசனம் - யோகாசனங்கள்

#### அலகு 2

இளமைகாத்தல் - பாலுணர்வும் ஆன்மீகமும் - மனதின் 10 படிநிலைகள் - மனஅலைச்சுழல்.

#### அலகு 3

குணநலப்பேறு வாழ்வின் நோக்கம் - எண்மை ஆராய்தல் - ஆசை சீரமைத்தல் - சினம்தவிர்த்தல்.

#### அலகு 4

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

#### அலகு 5

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



**Text Book**

<b>S.No.</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
1.	மனவளக்கலை யோகா	மனவளக்கலை யோகா	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	

**Reference Books**

1.		மனவளக்கலை யோகா –I	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
2.		மனவளக்கலை யோகா –II	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
3.		மனவளக்கலை யோகா –III	உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	
4.	எளிமுறை உடற்பயிற்சி		உலக சமுதாய சேவா சங்கம் வேதாத்திரி பதிப்பகம்	

**Mapping with Programme Outcomes**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	M	S	M
<b>CO2</b>	S	M	S	M	S
<b>CO3</b>	M	S	M	S	M
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	M	S	S	M

**S-** Strong; **M-**Medium

## SEMESTER - II

<b>ECC - II</b>	<b>B.Sc. Computer Science</b>	<b>2019 - 2020</b>
<b>M19UES01</b>	<b>ENVIRONMENTAL STUDIES</b>	
<b>Credit: 2</b>		

### Objectives

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

### Course Outcomes

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

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

### Unit - I - Fundamentals

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

### Unit - II - Natural Resources

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

### Unit - III - Biodiversity

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

### Unit - IV - Environmental Pollution

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

## Unit – V – Pollution and Environment

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

### Reference Books

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

### Mapping with Programme Outcomes

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

**S**- Strong; **M**-Medium