



# MAHENDRA ARTS & SCIENCE COLLEGE (Autonomous)

Affiliated to Periyar University, Salem.

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

## DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

Number of Courses Focusing on Employability/ Entrepreneurship/ Skill Development

Programme : B.Sc Computer Science

S.No.	Year	Total No. of Courses	Employability (1)	Entrepreneurship (2)	Skill development (3)	Total No. of Courses (1+2+3)
1	2020-2021	33	6	-	6	12
2	2019-2020	51	15	-	12	27
3	2018-2019	51	14	-	15	29
4	2017-2018	34	7	-	7	14
5	2016-2017	16	4	-	2	6

*M. Suresh Kumar*

Head of the Department

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

*[Signature]*  
Principal

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## DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Programme : B.Sc. CS

S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill development
1.	Computer Organization and Architecture	M19UCS01	✓	-	✓
2.	Programming in C	M19UCS02	✓	-	✓
3.	Practical –I - Programming in C	M19UCSP01	-	-	✓
4.	Data Structures	M19UCS03	✓	-	✓
5.	Object Oriented Programming with C++	M19UCS04	✓	-	✓
6.	Practical –II- Data Structures Using C++	M19UCSP02	-	-	✓
7.	Relational Database Management Systems	M19UCS05	✓	-	✓
8.	Practical – III Oracle	M19UCSP03	-	-	✓
9.	NMEC- I- Fundamentals of Information Technology	M19NCS01	-	-	✓
10.	NMEC- I-Working Principles of Internet	M19NCS02	-	-	✓
11.	SEC-I–MS – Office	M19UCSS01	-	-	✓
12.	Programming in Java	M19UCS06	✓	-	✓
13.	Practical – IV – Programming in Java	M19UCSP04	✓	-	✓
14.	NMEC-II- Fundamentals of Web Design	M19NCS03	-	-	✓
15.	NMEC-II-Programming in C	M19NCS04	-	-	✓
16.	SEC-II–Shell Programming	M19UCSS02	-	-	✓
17.	Web Technology	M19UCS07	✓	-	✓
18.	.Net Programming	M19UCS08	✓	-	✓

  
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S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill development
19.	Data Communication and Networking	M19UCS09	✓	-	-
20.	Operating Systems	M19UCS10	✓	-	✓
21.	Elective – I - Compiler Design	M19UCSE01	✓	-	-
22.	Elective – I - Artificial Intelligence	M19UCSE02	✓	-	✓
23.	Elective – I - Distributed Computing	M19UCSE03	✓	-	✓
24.	Elective – I - Ruby on Rails	M19UCSE04	✓	-	✓
25.	Practical – V - Web Technology	M19UCSP05	-	-	✓
26.	Practical – VI - .Net Programming	M19UCSP06	-	-	✓
27.	SEC-III–Open Source Technology	M19UCSS03	-	-	✓
28.	Python Programming	M19UCS11	✓	-	✓
29.	Data Mining	M19UCS12	✓	-	✓
30.	Mobile Computing	M19UCS13	✓	-	✓
31.	Software Engineering	M19UCS14	✓	-	✓
32.	Elective – II - Network Security	M19UCSE05	✓	-	✓
33.	Elective – II - Cloud Computing	M19UCSE06	✓	-	✓
34.	Elective – II - Multimedia Systems	M19UCSE07	✓	-	✓
35.	Elective – II – Bioinformatics	M19UCSE08	✓	-	✓
36.	Practical – VII – Python Programming	M19UCSP07	-	-	✓
37.	Practical – VIII - Data mining using Rapid miner	M19UCSP08	-	-	✓
38.	SEC-IV - Perl Programming	M19UCSS04	-	-	✓

*M. Sreemath*

Head of the Department  
Head of the Department,  
Department of Computer Science,  
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## DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Programme : B.Sc. CS

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
1.	Computer Organization and Architecture	M19UCS01	Employability, Skill development	2019 - 2020
2.	Programming in C	M19UCS02	Employability, Skill development	2019 - 2020
3.	Practical -I - Programming in C	M19UCSP01	Skill development	2019 - 2020
4.	Data Structures	M19UCS03	Employability, Skill development	2019 - 2020
5.	Object Oriented Programming with C++	M19UCS04	Employability, Skill development	2019 - 2020
6.	Practical -II- Data Structures Using C++	M19UCSP02	Skill development	2019 - 2020
7.	Relational Database Management Systems	M19UCS05	Employability, Skill development	2019 - 2020
8.	Practical - III Oracle	M19UCSP03	Skill development	2019 - 2020
9.	NMEC-I- Fundamentals of Information Technology	M19NCS01	Skill development	2019 - 2020
10.	NMEC-I- Working Principles of Internet	M19NCS02	Skill development	2019 - 2020
11.	SEC-I-MS - Office	M19UCSS01	Skill development	2019 - 2020
12.	Programming in Java	M19UCS06	Employability, Skill development	2019 - 2020
13.	Practical - IV -Programming in Java	M19UCSP04	Skill development	2019 - 2020
14.	NMEC-II-Fundamentals of Web design	M19NCS03	Skill development	2019 - 2020
15.	NMEC-II-Programming in C	M19NCS04	Skill development	2019 - 2020
16.	SEC-II-Shell Programming	M19UCSS02	Skill development	2019 - 2020
17.	Web Technology	M19UCS07	Employability, Skill development	2019 - 2020
18.	.Net Programming	M19UCS08	Employability, Skill development	2019 - 2020

  
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S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
19.	Data Communication and Networking	M19UCS09	Employability, Skill development	2019 - 2020
20.	Operating Systems	M19UCS10	Skill development	2019 - 2020
21.	Elective – I - Compiler Design	M19UCSE01	Employability, Skill development	2019 - 2020
22.	Elective – I - Artificial Intelligence	M19UCSE02	Employability, Skill development	2019 - 2020
23.	Elective – I - Distributed Computing	M19UCSE03	Employability, Skill development	2019 - 2020
24.	Elective – I - Ruby on Rails	M19UCSE04	Employability, Skill development	2019 - 2020
25.	Practical – V - Web Technology	M19UCSP05	Skill development	2019 - 2020
26.	Practical – VI - .Net Programming	M19UCSP06	Skill development	2019 - 2020
27.	SEC-III–Open Source Technology	M19UCSS03	Skill development	2019 - 2020
28.	Python Programming	M19UCS11	Employability, Skill development	2019 - 2020
29.	Data Mining	M19UCS12	Employability, Skill development	2019 - 2020
30.	Mobile Computing	M19UCS13	Employability, Skill development	2019 - 2020
31.	Software Engineering	M19UCS14	Employability, Skill development	2019 - 2020
32.	Elective – II - Network Security	M19UCSE05	Employability, Skill development	2019 - 2020
33.	Elective – II - Cloud Computing	M19UCSE06	Employability, Skill development	2019 - 2020
34.	Elective – II - Multimedia Systems	M19UCSE07	Employability, Skill development	2019 - 2020
35.	Elective – II – Bioinformatics	M19UCSE08	Employability, Skill development	2019 - 2020
36.	Practical – VII – Python Programming	M19UCSP07	Skill development	2019 - 2020
37.	Practical – VIII - Data mining using Rapid miner	M19UCSP08	Skill development	2019 - 2020
38.	SEC-IV - Perl Programming	M19UCSS04	Skill development	2019 - 2020

*M. Sumanth*

**Head of the Department**  
**Head of the Department,**  
**Department of Computer Science**  
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**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**

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**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	1	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	1	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)**

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

**SKILL ENHANCEMENT COURSES**

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

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

Semester	Non-Major Elective Course	Course Code
III	Fundamentals of Information Technology	M19NCS01
	Working Principles of Internet	M19NCS02
IV	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)
Theory	75	30	25	10	100	40
Practical	60	24	40	16	100	40
Project	60	24	40	16	100	40

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



## **THEORY**

### **EVALUATION OF INTERNAL ASSESSMENT**

Test	: 15 Marks
Assignment	: 05 Marks
Attendance	: 05 Marks
	-----
Total	: 25 Marks
	-----

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

## **PRACTICAL**

### **EVALUATION OF INTERNAL ASSESSMENT**

Internal Exam	: 25 Marks
Record	: 15 Marks
	-----
Total	: 40 Marks
	-----

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

### **EVALUATION OF EXTERNAL ASSESSMENT**

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

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

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

## **PROJECT**

### **EVALUATION OF INTERNAL ASSESSMENT**

Review 1	: 10 Marks
Review 2	: 10 Marks
Review 3	: 10 Marks
Pre-Viva	: 10 Marks
	-----
Total	: 40 Marks
	-----

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

#### **4. Passing Minimum**

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

The Candidates shall be declared to have passed the 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 absent may resubmit the report, on the same topic, with concern of internal guide with necessary modifications / corrections / improvements in the subsequent Even Semester Examinations for evaluation and shall undergo viva-voce Examinations.

#### **7. Note**

##### **a) SWAYAM / MOOC – Free Online Education**

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

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

##### **b) Add-on courses**

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

## SEMESTER – I

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

### Objectives

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

### Course Outcomes

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

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

### UNIT I

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

### UNIT II

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

### UNIT III

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

### UNIT IV

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

## UNIT V

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

### Text Books

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

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

### Objectives

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

### Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the logic behind the execution of various applications	K1
CO2	Understand the concepts of C programming	K2
CO3	Analyze and discover bugs in the program	K4
CO4	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

## UNITIV

**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.

## UNITV

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

### Text Book

S.no.	Author	Title of the book	Publisher	Year of publication
1	E. Balagurusamy	Programming InANSI C	Tata Mc Graw Hill	7 <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 ProgrammeOutcomes

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

S- Strong; M-Medium

## SEMESTER I

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

### Objectives

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

### Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the mathematical functions while creating a program	K1
CO2	Understand the fundamental programming concepts	K2
CO3	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

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

### 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

CO	Statement	Knowledge Level
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

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

### Objectives

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

### Course Outcomes

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

CO	Statement	Knowledge Level
CO1	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 Inheritances – Hierarchical Inheritance – Hybrid Inheritance. **Exception Handling:** Basics of Exception Handling – Exception Handling Mechanism – Throwing and Catching Mechanism – Specifying Exceptions.

#### Text Book

S.No.	Author	Title of the book	Publisher	Year of publication
1.	E.Balagurusamy	Object Oriented Programming with C++	Tata Mc Graw Hill Publications	6 <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, Godfery Muganda	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 ProgrammeOutcomes

<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

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

#### Objectives

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

#### Course Outcomes

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

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

#### Unit - I

**Introduction:** Database system Application – Purpose of Database Systems- View of Data – Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management- Retrieval - Database Users and Administrators.

**Relational Databases:** introduction to the Relational Model ER-Model: Structure of Relational Databases - Database Schema – Keys.

#### Unit - II

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

**Intermediate SQL:** Joined Relations - Views - Transactions – Authorization.

#### Unit – III

**Data Normalization:** Pitfalls in Relational Database Design- Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form – **Database Security:** Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and roles – Data Encryption – Network Security.

#### Unit - IV

**PL/SQL:A Programming Language:** Fundamentals of PL/SQL – PL/SQL Block

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

**Unit - V**

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

**Reference Book**

1. Database Management Systems Ramakrishnan, Gehrke McGraw Hill 2004

**Mapping with Programme Outcomes**

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

S- Strong; M-Medium

### SEMESTER – III

<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>CO1</b>	S	M	M	M	S
<b>CO2</b>	M	S	S	S	M
<b>CO3</b>	M	M	S	S	M
<b>CO4</b>	M	S	M	S	S
<b>CO5</b>	S	M	S	M	S

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

## SEMESTER – IV

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

### Objectives

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

### Course Outcomes

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

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

### UNIT I

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

### UNIT II

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

### UNIT III

**Classes, Objects and Methods:** Introduction-Defining a Class – Method Declarations- Creating Objects- Accessing Class Members-Constructors-Methods Overloading-Static

Members-Nesting of Methods-Inheritance-Overriding Methods-Final Classes-Abstract Methods and Classes.

**UNITIV**

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

**UNITV**

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

**Text Book**

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

**Reference Books**

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

**Mapping with ProgrammeOutcomes**

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

S- Strong; M-Medium

## SEMESTER – IV

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

### Objectives

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

### Course Outcomes

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

CO	Statement	Knowledge Level
CO1	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 ProgrammeOutcomes

<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

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

### Objectives

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

### Course Outcomes

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

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

### Unit I

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

### Unit II

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

### Unit III

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

### Unit IV

**Scripting Languages: JavaScript:** Introduction-Language Elements-Objects of JavaScript-Other Objects. **VB Script:** Introduction-Embedding VBScript Code in an



HTMLDocument-Comments-Variables-Operators-Procedures Conditional Statements-  
Looping Constructs -Objects and VBScript -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	4thEdition 2011

### Reference Books

1.	Kogent Learning Solutions Inc	HTML5 BlackBook	Prentice Hall PTR	Dreamtech Press
2.	Akanksha Rastogi	Web Technology	K.Nath & Co Educational Publishers	1 <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

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

S- Strong; M-Medium

## SEMESTER - V

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

### Objectives

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

### Course Outcomes

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

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

### Unit I

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

### Unit II

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

### Unit III

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

## Unit IV

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

## Unit V

**ASP.Net and Database:** A SQL Primer – Writing SQL commands – Adding data to a table with insert – Looking into a table with select and from – Changing data with update.

**ADO.Net: Hello Database:** Creating a database – Creating websites for database use – Entering data from a website.

### Text Books

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

### Reference Books

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

### Mapping with Programme Outcomes

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

S- Strong; M-Medium

## SEMESTER V

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

### Objectives

To understand the Design and Organization of Data Communication and Networking

### Course Outcomes

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

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

### Unit I

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

### Unit II

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

### Unit III

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

### Unit IV

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

### Unit V

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

### Text Book

S.No	Author	Title of Book	Publisher	Year of Publication
1.	Behrouz A Forouzan	Data Communications and Networking	Tata McGraw Hill	5 <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
CO1	S	M	M	S	S
CO2	M	S	S	M	M
CO3	M	S	M	S	S
CO4	S	M	S	M	M
CO5	S	M	M	S	S

S- Strong; M-Medium

## SEMESTER V

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

### Objectives

To provide the Fundamental Concepts of Operating System.

### Course Outcomes

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

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

### UnitI

**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.

### UnitII

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

### UnitIII

**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.



#### UnitIV

**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 – MemoryMapped Files.

#### UnitV

**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 HillPublishing	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

CorePractical– V	B.Sc. Computer Science	2019 - 2020
M19UCSP05	PRACTICAL – V–WEB TECHNOLOGY	
Credit: 2		

### Objectives

To understand the Design of HTML with Java and VBScripting languages

### Course Outcomes

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

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

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

## Mapping with Programme Outcomes

<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

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

### Objectives

To understand the concepts of Python Programming

### Course Outcomes

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

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

### UNIT I

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

Core Course – XII	B.Sc. Computer Science	2019 – 2020
M19UCS12	DATA MINING	
Credit: 4		

### 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

CO	Statement	Knowledge level
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

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

### Objectives

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

### Course Outcomes

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

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

### UNIT I

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

### UNIT II

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

### UNIT III

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

## UNIT IV

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

## UNIT V

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

### Text Book

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

### Reference Books

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

### Mapping with Programme Outcomes

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

**S-Strong; M-Medium**

## SEMESTER VI

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

### Objectives

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

### Course Outcomes

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

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

### UNIT I

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

### UNIT II

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

### UNIT III

**Function-Oriented Software Design:** Overview of SA/SD Methodology - Structured Analysis - Data Flow Diagrams (DFDs). **Object Modeling Using UML:** Overview of Object -

Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.

**UNIT IV**

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

**UNIT V**

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

**Text Book**

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

**Reference Book**

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

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

**S-Strong; M-Medium**

## SEMESTER 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

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

### Objectives

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

### Course Outcomes

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

CO	Statement	Knowledge Level
CO1	Remember the basic concepts of Database storage	K1
CO2	Understand the concepts of information storage and retrieval	K2
CO3	Analyze How the Information can be stored and apply some algorithms when 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 Rapid miner.

## 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 V

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

### Objectives

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

### Course Outcomes

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

CO	Statement	Knowledge Level
CO1	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 RecursiveDescentParsing–PredictiveParsing–Bottom-up parsing–ShiftReduce Parsing – Operator Precedent Parsing.

### UNIT III

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

### UNIT IV

**Issues in the design of code generator:** – The target machine – Runtime Storage

management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

**UNITV**

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 ProgrammeOutcomes**

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

S- Strong; M-Medium

## SEMESTER V

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

### 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

CO	Statement	Knowledge Level
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.

#### UNITIV

**Game playing:** Overview – The minimax 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.

#### UNITV

**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>CO1</b>	M	M	S	S	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 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

CO	Statement	Knowledge Level
CO1	Remember about the basics of Ruby and arrays and variables.	K1
CO2	Understand the role of first step with rails and debugging.	K2
CO3	Analyze and 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.**

## UNITIV

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

## UNITV

**Forms:** The Data Input Workflow- Generic Forms – FormTag Helper. **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	Willey 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

CO	Statement	Knowledge Level
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

COs	PO1	PO2	PO3	PO4	PO5
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>CO1</b>	M	M	S	S	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 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

S.No	Author	Title of the book	Publisher	Year of publication
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

CO	Statement	Knowledge Level
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

S.No	Author	Title of Book	Publisher	Year of Publication
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

Cos	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	S
CO2	M	M	M	S	M
CO3	M	M	M	M	S
CO4	S	S	M	M	M
CO5	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 McGrawHill	2007
2.	Alan Neibauer	Office The Basics & Beyond	Tata McGrawHill	2008

### Mapping with Programme Outcomes

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

S - Strong; M - Medium

## SEMESTER IV

SEC – II	B.Sc. Computer Science	2019 - 2020
M19UCSS02	SEC - II - SHELL PROGRAMMING	
Credit: 2		

### 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

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

### UNIT I

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

### UNIT II

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

### UNIT III

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

### UNIT IV

**Decisions :** Exit Status – The test Command – The else Construct – The exit Command

– The Elif Construct – The case command – The Null Command – The && and || Constructs.

## UNIT V

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

### Text Book

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

### Reference Book

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

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

S- Strong; M-Medium

## SEMESTER V

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

### Objectives

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

### Course Outcomes

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

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

### UNIT-I

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

### UNIT-II

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

### UNIT-III

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

### UNIT-IV

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

#### UNIT-V

**Date and Time Functions:** data, data\_default\_timezone\_set, strtotime, mktime.

**Handling Files:** create- fopen - fread - fwrite – include – fclose – unlink – fgets – fgetc – feof - require-require\_once.

#### Text Book

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

#### Reference Book

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

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

S- Strong; M-Medium

## SEMESTER VI

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

### Objectives

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

### Course Outcomes

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

### UNIT I

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

### UNIT II

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

### UNIT III

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

### UNIT IV

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

## UNIT V

**Perl control statements:** Perl control structures –syntax and operation of if statements –if statements –if\_else statements –if\_else if statement –if\_elseif\_else –unless modifier –the while loop –the until loop –the for loop –the for each loop.

### Text Book

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

### Reference Books

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

### Mapping with Programme Outcomes

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

S-Strong; M-Medium



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

### SEMESTER III

NMEC – I	OTHER DEPARTMENTS	2019 - 2020
M19NCS01	FUNDAMENTALS OF INFORMATION TECHNOLOGY	
Credit: 2		

#### 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

CO	Statement	Knowledge Level
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)

### UNITIII

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

### UNITIV

**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.

### UNITV

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 ProgrammeOutcomes

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

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

#### 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

CO	Statement	Knowledge Level
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

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

### 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

CO	Statement	Knowledge Level
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.

## UNITY

**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

NMEC – II	OTHER DEPARTMENTS	2019 - 2020
M19NCS04	PROGRAMMING IN C	
Credit: 2		

### 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

CO	Statement	Knowledge Level
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 ProgrammeOutcomes

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**



# MAHENDRA ARTS & SCIENCE COLLEGE (Autonomous)

Affiliated to Periyar University, Salem.

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

## DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Programme : B.Sc. CS

S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill Development
1.	Computer Fundamentals & Microprocessor	M16UCS01	✓	-	✓
2.	Programming in C	M16UCS02	✓	-	✓
3.	Core Practical I: Programming in C	M16UCSP01	-	-	✓
4.	Data Structures	M16UCS03	✓	-	✓
5.	Object Oriented Programming with C++	M16UCS04	✓	-	✓
6.	Core Practical II: Data Structures using C++	M16UCSP02	-	-	✓
7.	Design and Analysis of Algorithms	M16UCS05	✓	-	✓
8.	Java Programming	M16UCS06	✓	-	✓
9.	Core: Practical - III: Java	M16UCSP03	-	-	✓
10.	NMEC - I: Fundamentals of Information Technology	M16UCSN01	-		✓
11.	NMEC-I: Basics of Computers and Office Automation	M16UCSN02	-	-	✓
12.	Operating System	M16UCS07	✓	-	✓
13.	Relational Data Base Management System	M16UCS08	✓	-	✓
14.	Core: Practical - IV: Oracle	M16UCSP04	-	-	✓
15.	NMEC - II: Introduction to Object Oriented Programming Language C++	M16UCSN03	-	-	✓
16.	NMEC-II: HTML and Web Design	M16UCSN04			✓
17.	Software Engineering	M16UCS09			✓

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S.No.	Course Name	Course Code	Employability	Entrepreneurship	Skill Development
18.	Programming in Python	M16UCS10	✓	-	✓
19.	Web Technology	M16UCS11	✓	-	✓
20.	Computer networks	M16UCS12	✓	-	✓
21.	Elective -I -Principles of Human Computer Interaction	M16UCSE01	✓	-	✓
22.	Elective -I -Computer Graphics	M16UCSE02	✓	-	✓
23.	Elective -I – Open Source software Development	M16UCSE03	✓	-	✓
24.	Elective -I -Object Oriented System Design	M16UCSE04	✓	-	✓
25.	Core: Practical – V: Web Technology using PHP	M16UCSP05	-	-	✓
26.	SBEC –I: Office Automation	M16UCSS01	-	-	✓
27.	SBEC –II: Mobile Application Development	M16UCSS02	-	-	✓
28.	Data Mining and Warehousing	M16UCS13	✓	-	✓
29.	MAT Lab Programming	M16UCS14	✓	-	✓
30.	Principles of Cloud Computing	M16UCS15	✓	-	✓
31.	Elective II: Internet of Things	M16UCSE05	✓	-	✓
32.	Elective -II-Client / Server Technology	M16UCSE06	✓	-	✓
33.	Elective -II- Multimedia Systems	M16UCSE07	✓	-	✓
34.	Elective -II- E-Learning	M16UCSE08	✓	-	✓
35.	Core: Practical – VI: Data Mining using Rapid Miner	M16UCSP06	-	-	✓
36.	SBEC –III: Business Process Outsourcing	M16UCSS03	-	-	✓
37.	SBEC –IV: Desktop Publishing	M16UCSS04	-	-	✓

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**Head of the Department,**  
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## DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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

Programme : B.Sc. CS

S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
1.	Computer Fundamentals & Microprocessor	M16UCS01	Employability Skill development	2016 - 2017
2.	Programming in C	M16UCS02	Employability Skill development	2016 - 2017
3.	Core Practical I: Programming in C	M16UCSP01	Skill development	2016 - 2017
4.	Data Structures	M16UCS03	Employability Skill development	2016 - 2017
5.	Object Oriented Programming with C++	M16UCS04	Employability Skill development	2016 - 2017
6.	Core Practical II: Data Structures using C++	M16UCSP02	Skill development	2016 - 2017
7.	Design and Analysis of Algorithms	M16UCS05	Employability Skill development	2016 - 2017
8.	Java Programming	M16UCS06	Employability Skill development	2016 - 2017
9.	Core: Practical – III: Java	M16UCSP03	Skill development	2016 - 2017
10.	NMEC – I: Fundamentals of Information Technology	M16UCSN01	Skill development	2016 - 2017
11.	NMEC-I: Basics of Computers and Office Automation	M16UCSN02	Skill development	2016 - 2017
12.	Operating System	M16UCS07	Employability Skill development	2016 - 2017
13.	Relational Data Base Management System	M16UCS08	Employability Skill development	2016 - 2017
14.	Core: Practical – IV: Oracle	M16UCSP04	Skill development	2016 - 2017
15.	NMEC – II: Introduction to Object Oriented Programming Language C++	M16UCSN03	Skill development	2016 - 2017
16.	NMEC-II: HTML and Web Design	M16UCSN04	Skill development	2016 - 2017

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S.No.	Name of the Course	Course Code	Employability/ Entrepreneurship/ Skill development	Year of introduction (during the last five years)
17.	Software Engineering	M16UCS09	Employability Skill development	2016 - 2017
18.	Programming in Python	M16UCS10	Employability Skill development	2016 - 2017
19.	Web Technology	M16UCS11	Employability Skill development	2016 - 2017
20.	Computer networks	M16UCS12	Employability Skill development	2016 - 2017
21.	Elective -I -Principles of Human Computer Interaction	<b>M16UCSE01</b>	Employability Skill development	2016 - 2017
22.	Elective -I -Computer Graphics	<b>M16UCSE02</b>	Employability Skill development	2016 - 2017
23.	Elective -I – Open Source software Development	M16UCSE03	Employability Skill development	2016 - 2017
24.	Elective -I -Object Oriented System Design	<b>M16UCSE04</b>	Employability Skill development	2016 - 2017
25.	Core: Practical – V: Web Technology using PHP	M16UCSP05	Skill development	2016 - 2017
26.	SBEC –I: Office Automation	M16UCSS01	Skill development	2016 - 2017
27.	SBEC –II: Mobile Application Development	M16UCSS02	Skill development	2016 - 2017
28.	Data Mining and Warehousing	M16UCS13	Employability Skill development	2016 - 2017
29.	MAT Lab Programming	M16UCS14	Employability Skill development	2016 - 2017
30.	Principles of Cloud Computing	M16UCS15	Employability Skill development	2016 - 2017
31.	Elective II: Internet of Things	M16UCSE05	Employability Skill development	2016 - 2017
32.	Elective -II-Client / Server Technology	M16UCSE06	Employability Skill development	2016 - 2017
33.	Elective -II- Multimedia Systems	M16UCSE07	Employability Skill development	2016 - 2017
34.	Elective -II- E-Learning	M16UCSE08	Employability Skill development	2016 - 2017
35.	Core: Practical – VI: Data Mining using Rapid Miner	M16UCSP06	Skill development	2016 - 2017
36.	SBEC –III: Business Process Outsourcing	M16UCSS03	Skill development	2016 - 2017
37.	SBEC –IV: Desktop Publishing	M16UCSS04	Skill development	2016 - 2017

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*J. L. V*

Principal

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**BACHELOR OF SCIENCE**

**CHOICE BASED CREDIT SYSTEM**

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

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

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**MAHENDRA ARTS & SCIENCE COLLEGE**  
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**KALIPPATTI, NAMAKKAL (Dt.) – 637501.**

**REGULATIONS FOR B.Sc. (COMPUTER SCIENCE) DEGREE COURSE**  
**with Semester System and CBCS Pattern**  
**(Effective from the academic year 2016 - 2017)**

**1. OBJECTIVE OF THE COURSE**

The three year degree program addresses the need for advanced training in information systems and computing theory among the professionals in the computer industry with minimal training in the field of computer science. It is designed to enable the students to acquire the necessary background in computer science in preparation for advanced studies; to gain knowledge and skills in computer science as applied in their field of work and to develop and improve their techniques in the practice of proper design and development of application software.

**2. ELIGIBILITY FOR ADMISSION**

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

**3. DURATION OF THE COURSE**

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

**4. COURSE OF STUDY**

The course of study shall comprise instructions in the following subjects according to the syllabus and books prescribed from time to time. The syllabus for various subjects is clearly demarcated into five viable UNITS in each paper / subject. And the subject as Part-I, Part-II, Part-III, Part-IV and part V as prescribed in the scheme of examination.



## **5. EXAMINATION**

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

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

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

## **7. REVISION OF REGULATIONS AND CURRICULUM**

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

## **8. PASSING MINIMUM**

### **a) THEORY**

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

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

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

### **b) PRACTICAL**

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



## Practical Marks Distribution

Max. Marks: 100

Internal [CIA]: 40 Marks & External [EA]: 60 Marks

### Internal Marks Distribution (Total Marks: 40)

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

The components for continuous internal assessment are:

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

### External Marks Distribution (Total Marks: 60)

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

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

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

Failed candidates in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by written test and by assignment submission.

## 9. QUESTION PAPER PATTERN

### a) THEORY -Total Marks: 75

**Time: 3 Hrs. PART**

– A (10 x 2 = 20 Marks)

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

PART – B (5 x 5 = 25 Marks)

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

PART – C (3 x 10 = 30 Marks)

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

### b) PRACTICAL - Total Marks: 60

**Time: 3 Hrs.**

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

1. a. From the list of practical's 1, 2 and 3 (or) b. From the list of practical's 4 and 5  
**AND**
2. a. From the list of practical's 6, 7 and 8 (or) b. From the list of practical's 9 and 10

## 10. CLASSIFICATION OF SUCCESSFUL CANDIDATES

- FIRST CLASS WITH DISTINCTION – 75% and above at the first appearance
  - FIRST CLASS - 60% and above
  - SECOND CLASS - 50% to 59%

## 11. COMMENCEMENT OF REGULATIONS

These regulations shall take effect for the academic year 2015 – 2016, i.e., for students who are to be admitted in the first year of the course during the academic year 2015 – 2016.

### *Credit Distribution*

Semester	No. of Credits						Total Credits	Max. Marks
	I	II	III	IV	V	VI		
Part I: Tamil	3	3	3	3			12	400
Part II: English	3	3	3	3			12	400
Part III: Major	7	7	8	8	16	12	58	1500
Part III: Elective					3	3	6	200
Part III: Core Practical	2	2	2	2	2	2	12	600
Part III: Project	-	1	-	1	-	2	4	300
Part III: Allied	4	4	4	4			16	400
Part III: Allied Practical			2	2			4	200
Part IV: Value Education	2	-					4	100
Part IV: NMEC			2	2			4	200
Part IV: SBEC					4	4	8	400
Part IV: Environmental Studies	-	2	-	-	-	-	-	100
Part V: Value Added Course	1	1	1	1	-	-	4	400
Part V: Extension Activities	-	-	-	-	-	1	1	--
<b>Total</b>	<b>22</b>	<b>23</b>	<b>25</b>	<b>26</b>	<b>25</b>	<b>24</b>	<b>145</b>	<b>5200</b>

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
<b>Semester I</b>									
1	Part I	Tamil-I / Hindi-I / French-I / Malayalam – I / Telugu –I	M16UFTA01/ HI01 / FR01 / MA01 / TE01	5	3	25	75	100	3
2	Part II	English – I	M16UFEN01	5	3	25	75	100	3
3	Part III	Core I : Computer Fundamentals & Microprocessor	M16UCS01	4	3	25	75	100	3
4		Core II: Programming in C	M16UCS02	5	3	25	75	100	4
5		Allied I: Mathematics	M16UMAA03	5	3	25	75	100	4
6		Core Practical I: Programming in C	M16UCSP01	3	3	40	60	100	2
7	Part IV	Value Education: Yoga	M16UVE01	1	3	25	75	100	2
8	Part V	Value Added I: Communicative English –I	M16UVA03	2	3	100	-	100	1
<b>Total</b>				<b>30</b>		<b>290</b>	<b>510</b>	<b>800</b>	<b>22</b>

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
<b>Semester II</b>									
1	Part I	Tamil-II / Hindi-II / French-II / Malayalam – II / Telugu –II	M16UFTA02/ HI02 / FR02 / MA02 / TE02	5	3	25	75	100	3
2	Part II	English – II	M16UFEN02	5	3	25	75	100	3
3	Part III	Core III: Data Structures	M16UCS03	4	3	25	75	100	3
4		Core IV: Object Oriented Programming with C++	M16UCS04	5	3	25	75	100	4
5		Allied II : Numerical & Statistical Methods	M16USTA01	5	3	25	75	100	4
6		Core Practical II: Data Structures using C++	M16UCSP02	3	3	40	60	100	2
7	Part IV	Environmental Studies	M16UES01	1	3	25	75	100	2
8	Part V	Value Added - II: Communicative English-II	M16UVA04	2	3	100	-	100	1
9	Part III	Project – I	M16UCSPR1	1	3	100	1	100	1
<b>Total</b>				<b>30</b>		<b>390</b>	<b>510</b>	<b>900</b>	<b>23</b>

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
<b>Semester III</b>									
1	Part I	Tamil-III / Hindi-III / French-III / Malayalam – III / Telugu –III	M16UF TA03/ HI03 / FR03 / MA03 / TE03	5	3	25	75	100	3
2	Part II	English – III	M16UFEN03	5	3	25	75	100	3
3	Part III	Core V: Design and Analysis of Algorithms	M16UCS05	4	3	25	75	100	4
4		Core VI: Java Programming	M16UCS06	4	3	25	75	100	4
5		Allied III : Applied Electronics / Principles of Accountancy	M16UPHA03 / M16UCCA01	4	3	25	75	100	4
6		Core: Practical – III: Java	M16UCSP03	2	3	40	60	100	2
7		Allied : Practical I– Digital Electronics / Accountancy (Tally)	M16UPHAP02 / M16UCCAP01	2	3	40	60	100	2
8	Part IV	NMEC – I: Applied Statistics	M16USTN01	2	3	25	75	100	2
9	Part V	Value Added III : Quantitative Aptitude	M16UVA05	2	3	100	-	100	1
<b>Total</b>				<b>30</b>		<b>330</b>	<b>570</b>	<b>900</b>	<b>25</b>

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
<b>Semester IV</b>									
1	Part I	Tamil-IV / Hindi-IV / French-IV / Malayalam – IV / Telugu –IV	M16UFTA04/ HI04 / FR04 / MA04 / TE04	5	3	25	75	100	3
2	Part II	English – IV	M16UFEN04	5	3	25	75	100	3
3	Part III	Core VII: Operating System	M16UCS07	4	3	25	75	100	4
4		Core VIII: Relational Data Base Management System	M16UCS08	4	3	25	75	100	4
5		Allied IV : Advanced Electronics / Modern Banking	M16UPHA04 / M16UCCA01	4	3	25	75	100	4
6		Core: Practical – IV: Oracle	M16UCSP04	2	3	40	60	100	2
7		Allied : Practical II– Applied Electronics / Commerce Practical	M16UPHAP03 / M16UCCA01	2	3	40	60	100	2
8	Part IV	NMEC – II: Business Communication	M16UCMN04	2	3	25	75	100	2
9	Part V	Value Added IV: Verbal and Logical Reasoning	M16UVA06	2	3	100	-	100	1
10	Part III	Industrial Literacy	M16UCSPR2	-	3	100	-	100	1
<b>Total</b>				<b>30</b>		<b>430</b>	<b>570</b>	<b>1000</b>	<b>26</b>

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
<b>Semester V</b>									
1	Part III	Core IX: Software Engineering	M16UCS09	5	3	25	75	100	4
2		Core X: Programming in Python	M16UCS10	5	3	25	75	100	4
3		Core XI: Web Technology	M16UCS11	5	3	25	75	100	4
4		Core XII: Computer networks	M16UCS12	4	3	25	75	100	4
5		Elective I:		4	3	25	75	100	3
6		Core: Practical – V: Web Technology using PHP	M16UCSP05	3	3	40	60	100	2
7	Part IV	SBEC –I: Office Automation	M16UCSS01	2	3	25	75	100	2
8		SBEC –II: Mobile Application Development	M16UCSS02	2	3	25	75	100	2
<b>Total</b>				<b>30</b>		<b>215</b>	<b>585</b>	<b>800</b>	<b>25</b>

S. No.	Part	Subject	Subject Code	Hrs. / Week	Exam Duration (Hrs)	Maximum Marks			Credit Points
						CIA	EA	Total	
<b>Semester VI</b>									
1	Part III	Core XIII: Data Mining and Warehousing	M16UCS13	6	3	25	75	100	4
2		Core XVI: MAT Lab Programming	M16UCS14	6	3	25	75	100	4
3		Core XV: Principles of Cloud Computing	M16UCS15	6	3	25	75	100	4
4		Elective II		5	3	25	75	100	3
5		Core: Practical – VI: Data Mining using Rapid Miner	M16UCSP06	3	3	40	60	100	2
6	Part IV	SBEC –III: Business Process Outsourcing	M16UCSS03	2	3	25	75	100	2
7		SBEC –IV: Desktop Publishing	M16UCSS04	2	3	25	75	100	2
8	Part III	Project II	M16UCSPR3	-	3	25	75	100	2
9	Part V	Extension Activities	M16UEX01	-	-	-	-	-	1
<b>Total</b>				<b>30</b>		<b>215</b>	<b>585</b>	<b>800</b>	<b>24</b>

<b>Semester I</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 1</b>	<b>COMPUTER FUNDAMENTALS &amp; MICROPROCESSOR</b>	
<b>M16UCS01</b>		
<b>Credit: 3</b>		

### **UNIT-I**

**Introduction to computers:** Introduction - Types of Computers-Characteristics of Computer - Five Generations of Modern Computers - Classification of Digital Computer Systems - Number System.

### **UNIT-II**

Anatomy of a Digital Computer - Memory Units - Input Devices - Output Devices - Auxiliary Storage Devices.

### **UNIT-III**

**Computer software: Programming Languages - Operating Systems - Computer networks.**

### **UNIT-IV**

Introduction to Telecommunications - Introduction to Word Processing - Internet -Electronic mail.

### **UNIT-V**

**Microprocessors, Microcomputers, and Assembly Language:** Microprocessors - Microprocessor as a CPU (MPU) - Organization of a Microprocessor Based System. **Microprocessor instruction set and computer Languages: Machine Language - 8085 Machine Language - 8085 Assembly Language - High-Level Language. Microprocessor Architecture and Micro Computer Systems:** Microprocessor Architecture and its Operations. **Memory:** Flip-Flop or Latch as a Storage Element - Memory Map and Addresses - Memory and Instructions Fetch. **8085 Microprocessor Architecture and Memory Interfacing:** The 8085 MPU - A Detailed Look at the 8085 MPU Architecture - Decoding and Executing an Instruction.

### **TEXT BOOKS**

1. "Computer Science and communication Engineering", Alexis Leon Mathews Leon co-published by Leon Press and Vikas publishing house Pvt Ltd. (UNIT I ,II ,III, IV).
2. "Microprocessor Architecture Programming and Application with the 8085", Ramesh Gaonkar, 5<sup>th</sup> Edition. (UNIT V).

### **REFERENCE BOOK**

1. Thomas C Bartee, "Digital Computer Fundamentals", Tata Mcgraw hill 6<sup>th</sup> Edition.

Semester I	B.Sc. Computer Science	2016-2017
Core: 2	PROGRAMMING IN C	
M16UCS02		
Credit: 4		

## UNIT I

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

## UNIT II

**Managing Input and Output Operations:** Reading and writing a character\_– Formatted input and output. **Decision Making and Branching:** Simple IF, IF-ELSE, Nesting of IF-ELSE, ELSE-IF ladder, Switch statements-The ?: Operator – GOTO statements. **Decision Making and Looping:** WHILE statement – DO statement – FOR statement\_– Jumps in loops.

## UNIT III

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

## UNIT IV

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

## UNIT V

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



**TEXT BOOK**

Programming in ANSI C, by E. Balagurusamy, Tata McGraw Hill, 6<sup>th</sup> Edition.

**REFERENCE BOOKS**

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

Semester I	B.Sc. Computer Science	2016-2017
Core Practical I	PROGRAMMING IN C	
M16UCSP01		
Credit: 2		

### List of Practical's

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

<b>Semester II</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 3</b>	<b>DATA STRUCTURES</b>	
<b>M16UCS03</b>		
<b>Credit: 3</b>		

### Unit - I

**Algorithms:** Algorithms (Analysis and Design) – Problem Solving – Top-down and Bottom-up approaches to algorithm design – Use of algorithms in Problem Solving - Design of Algorithms – Efficiency analysis of Algorithms. **Basic Concepts:** Abstract Data Type (ADT) – Fundamentals and Derived Data Types- Primitive Data Structures – Symbol Table - Recursion.

### Unit - II

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

### Unit - III

**Linked lists:** Introduction – Representation of Linked List - Types of linked list – Implementation of Linked List - Operations performed on linked list. **Stacks:** Introduction – Representation Stacks - Implementation of Stack – Polish Notation – **Queues:** Introduction – Representation of Queues - Implementation of Queues – Circular Queue – Priority Queue – D-Queue.

### Unit - IV

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

### Unit - V

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

## **TEXT BOOKS**

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

## **REFERENCE BOOKS**

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

<b>Semester II</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 4</b>	<b>OBJECT ORIENTED PROGRAMMING WITH C++</b>	
<b>M16UCS04</b>		
<b>Credit: 4</b>		

### UNIT – I

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

### UNIT – II

**Elements of C++:** Tokens – Keyword – Identifier and Constants – Symbolic Constants - Basic Data Type: User – Defined Data Types – Derived Data Types – Variables: Declaration – Initialization and Reference – Operators in C++ - Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Type Cast Operator -Expressions and their Types – Special Assignment Expressions – Control Structures

### UNIT – III

**Functions in C++:** The Main Function – Prototyping – Call by Reference – Return by Reference – Inline Functions – Default Arguments – const Arguments – Recursion - Function Overloading – Friend and Virtual Functions – Classes and Objects – **Constructors and Destructors:** Constructors – Parameterized and Multiple Constructors – Constructors with Default Arguments – Dynamic Initialization – Copy and Dynamic Constructors - Destructors

### UNIT – IV

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

## **UNIT – V**

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

### **TEXT BOOK**

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

### **REFERENCE BOOKS**

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

<b>Semester II</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core Practical: II</b>	<b>Practical II - DATA STRUCTURES USING C++</b>	
<b>M16UCSP02</b>		
<b>Credit: 2</b>		

### **List of Practical's**

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

<b>Semester III</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 5</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	
<b>M16UCS05</b>		
<b>Credit: 4</b>		

### UNIT – I

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

### UNIT – II

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

### UNIT – III

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

### UNIT – IV

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

### UNIT – V

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

### TEXT BOOK

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

### REFERENCE BOOK

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



<b>Semester III</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 6</b>	<b>JAVA PROGRAMMING</b>	
<b>M16UCS06</b>		
<b>Credit: 4</b>		

## UNIT I

**Java Evolution:** Introduction-Java features –How to Java differs from C and C++-Java and Internet-Java and WWW Browser-Hardware & Software Requirements-Java Support Systems-Java Environment-Java Program Structure-Java Tokens-Java Statements-**JVM-Command Line Arguments. Constants, Variables & Data Types:** Constants-Variables-Data Types-Declaration of Variables-Giving Values to Variables-Scope of Variables-Symbolic Constants-Type Casting - Operators and Expressions.

## UNIT II

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

## UNIT III

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

## UNIT IV

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

## **UNIT V**

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

### **TEXT BOOK**

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

### **REFERENCE BOOK**

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

<b>Semester III</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: Practical III</b>	<b>Practical III: JAVA</b>	
<b>M16UCSP03</b>		
<b>Credit: 2</b>		

### **List of Practical's**

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

<b>Semester - IV</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 7</b>	<b>OPERATING SYSTEM</b>	
<b>M16UCS07</b>		
<b>Credit: 4</b>		

### UNIT - I

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

### UNIT - II

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

### UNIT - III

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

### UNIT - IV

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

### UNIT - V

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

### TEXT BOOKS

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

### REFERENCE BOOKS

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

<b>Semester - IV</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 8</b>	<b>RELATIONAL DATABASE MANAGEMENT SYSTEMS</b>	
<b>M16UCS08</b>		
<b>Credit: 4</b>		

### UNIT-I

**Introduction:** Database system Application – Purpose of Database Systems- View of Data – Database Languages - Relational Databases - Database Design - Data Storage and Querying- Transaction Management- Database Architecture - Data Mining and Information.

**Retrieval** - Specialty Databases - Database Users and Administrators **Relational Databases:** introduction to the Relational Model ER- Model: Structure of Relational Databases- Database Schema –Keys.

### UNIT-II

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

### UNIT-III

**Data Normalization:** Pitfalls in Relational Database Design- Decomposition – Functional Dependencies – Normalization – First Normal Form – Second Normal Form – Third Normal Form – Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form – De normalization – **Database Security:** Data Security Requirements – Protecting the Data within the Database – Granting and Revoking Privileges and roles – Data Encryption – Network Security – Authenticating users to the database.

### UNIT-IV

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

## UNIT-V

**PL/SQL Cursors and Exceptions:** Cursors – Implicit Cursors - Explicit Cursors – Explicit Cursor Attributes – Implicit Cursor Attributes - Cursor for Loops – SELECT... FOR UPDATE Cursor – WHERE CURRENT OF CLAUSE – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.**PL/SQL Composite Data Types: Records, Tables and V arrays:** Composite Data Type – PL/SQL Records – PL/SQL Tables - PL/SQL V arrays – **PL/SQL Named Blocks: Procedures, Functions, Packages & Triggers:** Procedures – Functions – Packages - Triggers – Data Dictionary Views.

### TEXT BOOKS

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

### REFERENCE BOOKS

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

<b>Semester – IV</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core Practical: IV</b>	<b>Practical IV- Oracle</b>	
<b>M16UCSP04</b>		
<b>Credit: 2</b>		

### **List of Practical's**

1. Table Creation using various constraints.
2. Apply the constraints like Primary key, Foreign Key, Not Null to the tables.
3. Write the queries to implement the joins.
4. Write the queries for implementing the Aggregate functions.
5. Write a SQL statement for Nested sub queries.
6. Write a PL/SQL program of Employee's Pay Bill.
7. Write a PL/SQL program to calculate the area of circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table name areas.
8. Write a PL/SQL block to display electricity bill for the electricity consumers. The database should consist of consumer-no, name, add, units consumed. Insert the data of ten consumers and calculate the bills and using following rules.
  - a. No of units Rate/Unit For
  - b. First 100 units Rs. 6 per unit
  - c. Next 300 units Rs.4.25 per unit
  - d. Beyond 300 units Rs. 3.50 per unit.
9. Write a PL/SQL program of Student Details using Triggers.
10. Write a PL/SQL program of Voters Details using V-arrays.

Semester - V	B.Sc. Computer Science	2016-2017
Core: 9	SOFTWARE ENGINEERING	
M16UCS09		
Credit: 4		

## UNIT I

**Introduction:** Evolution-from an art form to an Engineering discipline – Software Development projects – Exploratory style of software development – Emergence of software engineering.

**Software Life cycle models:** A few basic concepts – Classical waterfall model – Iterative waterfall model- V-Model - Prototype model – Incremental development model - Evolutionary model – Spiral model.

## UNIT II

**Software project Management:** Software project management complexities - Responsibilities of Software Project Manager – Project Planning – Matrices for project size estimation – Project estimation techniques –Staffing level estimation – Scheduling – organization and team structures – Staffing – Risk management – Software configuration management.

**Requirement analysis and specification:** Requirements gathering and analysis – software requirement specification (SRS) – Formal system specification.

## UNIT III

**Software design:** How to characterize a good software design? – Cohesion and coupling – Layered arrangement of modules – Approaches to Software design.

**Function oriented software design:** Overview of SA/SD methodology – Structure analysis – Developing the DFD model of a system - Structure Design – Detailed Design – Design review.

## UNIT IV

**User Interface Design:** Characteristics of User Interface – Basic concepts – Types of user interfaces – components – Fundamentals of computer based GUI development –A User interface design methodology

**Coding and Testing:** Coding - Code Review – Software documentation - Testing – Black box testing – White box testing – Debugging – Program analysis tools – Integration testing – System testing.



## UNIT V

**Software Reliability and Quality management:** Software Reliability – Statistical testing – Software quality – Software Quality Management System.

**Computer Aided Software engineering :** Case environment – Case Support in software life cycle- Other Characteristics of case tools – Towards second generation case tool – Architecture of case environment.

**Software Maintenance:** Characteristics of software maintenance – Software Reverse Engineering – Software Maintenance process Models – Estimation of Maintaining cost – **Software reuse:** Basic Issue in any reuse program – A Reuse approach – Reuse at organization level - Emerging trends.

### TEXT BOOK

Fundamentals of Software Engineering, RAJIB MALL, Prentice Hall of India Private Limited,  
Fourth Edition - 2014

Semester - V	B.Sc. Computer Science	2016-2017
Core: 10	PROGRAMMING IN PYTHON	
M16UCS10		
Credit: 4		

## UNIT I

**The Content of Software Development:** Learning Programming with Python-Writing a Python Program-A Longer Python Program. **Values and Variables:** Integer Values-Variables and Assignments-Identifiers-Floating Point Types-Control Codes with Strings-User Input-The *eval* Function-Controlling the *print* Function. **Expression and Arithmetic:** Expression-Operator Precedence and associativity- Comments- Errors-Arithmetic Examples-More Arithmetic Operators-Algorithms.

## UNIT II

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

## UNIT III

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

## UNIT IV

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

## **UNIT V**

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

## **TEXT BOOK**

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

## **REFERENCE BOOK**

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

<b>Semester - V</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 11</b>	<b>WEB TECHNOLOGY</b>	
<b>M16UCS11</b>		
<b>Credit: 4</b>		

### UNIT – I

**Internet:** Introduction to Internet – History of the Internet – Web Concepts – Internet Standards..**Internet Protocols:** Introduction – Internet Protocols – Host Name –Internet Applications and Application Protocols - **HTML:** Introduction: SGML-HTML Document – Head Section - Body Section – HTML Forms.

### UNIT – II

**JavaScript:** Introduction – Language Elements – Objects of JavaScript - **VBScript:** Introduction: Variables – Operators – Procedures – Conditional Statements –Looping Constructs- Objects and VBScript – **DHTML: Introduction – Cascading Style Sheets (CSS) – DHTML Document Object Model and Collections – Event Handling – Filters and Transitions – Data Binding.**

### UNIT – III

**Common Gateway Interface(CGI) :** Introduction: Server-Browser Interaction - CGI Script Structure – The CGI.pm Module – CGI Environment Variables – Processing Forms – Sending Mail – Validating the Form Data – Handling Checkboxes – CGI Security Issues. **Servlets:** The Servlet Life Cycle – Servlet API – A Simple Servlet – Cookies – Session Tracking.

### UNIT – IV

**Java Server Pages (JSP):** Introduction: Advantages of JSP – Developing First JSP – Components of JSP – JSP Sessions – Cookies. **Active Server Pages:** Introduction – Advantages of ASP – First ASP Script – Variables and Constructs – Subroutines – ASP Cookies – ASP Objects – Connecting to Data with ASP.

## UNIT-V

**Introducing PHP** - Basic development Concepts - Creating first PHP Scripts - Using Variable and Operators - Storing Data in variable - **Controlling Program Flow:** Writing Simple Conditional Statements - Repeating Action with Loops - Working with String and Numeric Functions - **Using Functions and Classes:** Creating User-Defined Functions - Creating Classes - Working with Files and Directories: Reading Files - Writing Files - Processing Directories.

### TEXT BOOKS

1. “Web Technology A Developer’s Perspective”, N.P.Gopalan & J.Akilandeswari, PHI Learning Private Limited, New Delhi- 2014.
2. PHP A Beginner's Guide, Vikram Vas Want, Tata McGraw-Hill

### REFERENCE BOOKS

1. Web Technologies TCP/IP to Internet Applications Architectures – AchyutS Godbole & AtulKahate, 2007, TMH.
2. “The Complete Reference Java2”, Patrick Naughton, Herbert Schildt, Tata Mc-Graw Hill Publications, 3<sup>rd</sup> Edition, New Delhi.
3. The PHP Complete Reference , Steven Holzner, Tata McGraw-Hill Edition

<b>Semester - V</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 12</b>	<b>COMPUTER NETWORKS</b>	
<b>M16UCS12</b>		
<b>Credit: 4</b>		

### UNIT - I

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

### UNIT - II

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

### UNIT - III

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

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

### UNIT - IV

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

### UNIT - V

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

### TEXT BOOKS

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

### REFERENCE BOOK

“Data Communication and Networks”, Achyut S. Godbole, Tata McGraw Hill, 3<sup>rd</sup> Edition, New Delhi.

Semester - V	B.Sc. Computer Science	2016-2017
Core Practical : V	Practical -V - WEB TECHNOLOGY USING PHP	
M16UCSP05		
Credit: 2		

### List of Practical's

1. To write a HTML code for Loan Calculation
2. To write HTML program to validate Student Registration Form using JavaScript
3. To write a HTML code for image map.
4. To write a HTML program for creating simple Web Page using DHTML.
5. Write a Java Servlet program to create a session and display the various informations like(Last Accessed time, Modified time, Expiration )
6. To write a HTML program for Online Examination using JSP
7. Write a JSP program to implement the Telephone Directory
8. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
9. To write a PHP program is using Array, Control Structures, Looping structures and form handling.
10. To write a PHP program using storing and retrieving book information.

Semester - V	B.Sc. Computer Science	2016-2017
SBEC-I	SBEC I - Office Automation	
M16UCSS01		
Credit: 2		

### UNIT – I

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

### UNIT – II

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

### UNIT – III

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

### UNIT – IV

**Charting and Printing Your Data:** Charting your Data: Creating Charts-Modifying your Data: Changing Chart types- Enhancing Charts- Formatting Charts automatically. **Printing Worksheet and Charts:** Previewing your Worksheet- Setting up pages- Adding Headers and Footers.



## UNIT – V

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

### Text Books

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

<b>Semester - V</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>SBEC-II</b>	<b>SBEC II - Mobile Application Development</b>	
<b>M16UCSS02</b>		
<b>Credit: 2</b>		

### UNIT –I

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

### UNIT – II

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

### UNIT – III

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

### UNIT – IV

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

### UNIT –V

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

### TEXT BOOK

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

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

### REFERENCE BOOKS

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

Semester - V	B.Sc. Computer Science	2016-2017
ELECTIVE: I	PRINCIPLES OF HUMAN COMPUTER INTERACTION	
M16UCSE01		
Credit: 3		

## UNIT I

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

## UNIT II

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

## UNIT III

### The Interaction

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

## UNIT IV

### Design Process

**Interaction Design Basics:** What is Design: The Golden rule of design-To Err is human-Te central message-The user. The Process of Design – User Focus- Scenarios-**Navigation Design:**

Local Structure- Global Structure-hierarchical organization-Global Structure-Dialog. **Screen**

**Design and Layout:** Tools for Layout-User acting and control– Iteration and Prototyping.

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

## UNIT V

### Evaluation

**Techniques:** What is evaluation? -Goals of Evaluation – Evaluation through expert analysis- evaluation through user Participation – Choosing an Evaluation Method. **User Support:**

Introduction – Requirements of user support – Approaches to user Support – Adaptive help Systems –Designing user support Systems.

## TEXT BOOK

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

## REFERENCE BOOK

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

Semester - V	B.Sc. Computer Science	2016-2017
ELECTIVE: I	COMPUTER GRAPHICS	
M16UCSE02		
Credit: 3		

### UNIT – I

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

### UNIT – II

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

### UNIT – III

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

## UNIT – IV

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

## UNIT – V

**Visible-Surface Detection Methods:** Classification of Visible-Surface Detection algorithms-Back-Face Detection-Depth-Buffer Method-Buffer Method-Scan Line Method-Depth Sorting Method-BSP-Tree Method-Area Subdivision Method-Octree Methods-Ray-Casting Method-Curved Surfaces-Wireframe Methods-Visibility- Chromaticity Detection Functions. **Color Models and Color Applications:** Properties of Light-Standard Primaries and the Diagram-Intuitive Color Concepts-RGB Color Model-YIQ Color Model-CMY Color Model-HSV Color Model-Conversion between HSV and RGB Models-HLS Color Model-Color Selection and Applications. **Computer Animation:** Design of Animation Sequences-General Computer-Animation Functions-Raster Animations-Computer-Animation Languages-Key-Frame Systems-Motion Specifications

## TEXT BOOK

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

## REFERENCE BOOK

Introduction to Computer Graphics David J. Eck.

Semester – V	B.Sc. Computer Science	2016-2017
ELECTIVE: I	OPEN SOURCE SOFTWARE DEVELOPMENT	
M16UCSE03		
Credit: 3		

### UNIT – I

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

### UNIT – II

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

### UNIT – III

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

### UNIT – IV

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

## **UNIT – V**

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

### **TEXT BOOK**

Open Source Software: Implementation and Management by Paul Kavanagh.

### **REFERENCE BOOK**

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



<b>Semester - V</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>ELECTIVE: I</b>	<b>OBJECT ORIENTED SYSTEM DESIGN</b>	
<b>M16UCSE04</b>		
<b>Credit: 3</b>		

**UNIT I**

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

**UNIT II**

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

**UNIT III**

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

**UNIT IV**

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

**UNIT V****Case Study**

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

**TEXT BOOKS**

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

<b>Semester – VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 13</b>	<b>DATA MINING AND WAREHOUSING</b>	
<b>M16UCS13</b>		
<b>Credit: 4</b>		

**UNIT I**

**DATA MINING**

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

**UNIT II**

**ASSOCIATION RULE MINING AND CLASSIFICATION**

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

**UNIT III**

**CLUSTERING AND TRENDS IN DATA MINING**

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

**UNIT IV**

**BUSINESS ANALYSIS**

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

**UNIT V****DATA WAREHOUSING**

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

**Text Books**

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

**Reference Books**

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 14</b>	<b>MAT LAB PROGRAMMING</b>	
<b>M16UCS14</b>		
<b>Credit: 4</b>		

**Unit I**

**Introduction to MATLAB:** Getting into MATLAB - The MATLAB Desktop Environment - Variables and Assignment Statements - Expressions - Characters and Encoding - Vectors and Matrices.

**Unit II**

**Input / Output Scripts:** MATLAB Scripts - Input and Output - Scripts with Input and Output - Scripts to Produce and Customize Simple Plots - Introduction to File Input / Output (load and Save) - User defined Functions that Return a Single Value.

**Unit III**

**Selection Statements:** Relational Expressions - The If Statement - The If-Else Statement - Nested If-Else Statements- The Switch Statement - The Menu Function - The Is Functions in MATLAB Private Functions, and Nested Functions. **Loop Statements:** The For Loop - Nested For Loops - While Loops.

**Unit IV**

**Vectorized Code:** Loops with Vectors and Matrices - Operations on Vectors and Matrices - Vectors and Matrices as Function Arguments - Logical Vectors - Vectorizing Code - Timing. **String Manipulation:** Creating String Variables - Operations on Strings - The Is Functions for Strings - Converting Between String and Number Types.

**Unit V**

**Data Structures: Cell Arrays and Structures** - Cell Arrays - Structures. **Advanced File Input and Output:** Lower-Level File I /O Functions - Writing and Reading Spreadsheet Files - Using MAT-Files for Variables. **Advanced Plotting Techniques:** Plot Functions - Animation - Three Dimensional Plots - Customizing Plots -Handle Graphics and Plot Properties - Plot Applications.

**Text Book**

1. MATLAB A Practical Introduction to Programming and Problem Solving - Stormy Attaway, Second Edition, 2012 - ButterWorth-Heinemann.

**Reference Book**

1. MATLAB Programming for Engineers – Stephen J. Chapman – 4<sup>th</sup> Edition, 2008 – Thomson.

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core: 15</b>	<b>PRINCIPLES OF CLOUD COMPUTING</b>	
<b>M16UCS15</b>		
<b>Credit: 4</b>		

**UNIT – I Getting Started**

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

**UNIT – II**

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

**Cloud Computing Technology**

**Hardware and Infrastructure:** Clients – Security – Network – Services.

**UNIT – III**

**Accessing the Cloud:** Platforms – Web Applications – Web APIs – Web Browsers. **Cloud Storage:** Overview – Cloud Storage Providers. **Standards:** Applications – Client – Infrastructure – Service.

**UNIT – IV Cloud Computing at Work**

**Software as a Service:** Overview – Driving Forces – Company Offerings – Industries. **Software plus Services:** Overview – Mobile Device Integration – Providers – Microsoft Online.

**UNIT – V**

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

**TEXT BOOK**

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Core Practical : VI</b>	<b>Practical -VII – DATA MINING USING RAPID MINOR</b>	
<b>M16UCSP06</b>		
<b>Credit: 2</b>		

**List of Practical's**

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>SBEC-III</b>	<b>BUSINESS PROCESS OUTSOURCING</b>	
<b>M16UCSS03</b>		
<b>Credit: 2</b>		

**UNIT – I**

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

**UNIT – II**

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

**UNIT – III**

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

**UNIT – IV**

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

**UNIT – V**

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

**REFERENCE BOOKS**

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



<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>SBEC-IV</b>	<b>DESKTOP PUBLISHING</b>	
<b>M16UCSS04</b>		
<b>Credit: 2</b>		

**Unit I**

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

**Unit II**

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

**Unit III**

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

**Unit IV**

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

**Unit V**

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

**TEXT BOOK**

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

**REFERENCE BOOK**

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Elective - II</b>	<b>INTERNET OF THINGS</b>	
<b>M16UCSE05</b>		
<b>Credit: 3</b>		

**Unit I**

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

**Unit II**

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

**Unit III**

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

**Unit IV**

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

**Unit V**

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

## **Textbook**

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

## **Reference Books**

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Elective - II</b>	<b>CLIENT / SERVER TECHNOLOGY</b>	
<b>M16UCSE06</b>		
<b>Credit: 3</b>		

**UNIT I**

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

**UNIT II**

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

**UNIT III**

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

**UNIT IV**

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

**UNIT V**

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

**TEXT BOOK**

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

**REFERENCE BOOKS**

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Elective - II</b>	<b>MULTIMEDIA SYSTEMS</b>	
<b>M16UCSE07</b>		
<b>Credit: 3</b>		

**UNIT-I**

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

**UNIT-II**

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

**UNIT-III**

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

**UNIT-IV**

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

## UNIT-V

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

## TEXT BOOKS

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

## REFERENCE BOOKS

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

<b>Semester - VI</b>	<b>B.Sc. Computer Science</b>	<b>2016-2017</b>
<b>Elective – II</b>	<b>E-LEARNING</b>	
<b>M16UCSE08</b>		
<b>Credit: 3</b>		

**UNIT I**

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

**UNIT II**

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

**UNIT III**

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

**UNIT IV**

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

**UNIT V**

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

**Text Book**

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