MAHENDRA ARTS & SCIENCE COLLEGE

(AUTONOMOUS)

(Affiliated to Periyar University)

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

KALIPPATTI-637501

BACHELOR OF SCIENCE

SYLLABUS FOR B.Sc. INFORMATION TECHNOLOGY

OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM

FOR THE STUDENTS ADMITTED FROM

THE ACADEMIC YEAR 2023 – 2024 ONWARDS

MAHENDRA ARTS & SCIENCE COLLEGE
(Autonomous)
(Affiliated to Periyar University)

Department of Computer Science & Applications

**REGULATIONS FOR B.Sc. Information Technology PROGRAMME
OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM
(Effective from the academic year 2023-2024)**

I. PREAMBLE

B.Sc. Information Technology 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) 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.

II. GRADUATES ATTRIBUTES

- **In-depth knowledge and understanding of major concepts:**

  Understanding of theoretical principles and experimental findings in different sub-areas available in respective disciplines

- **Creative and Critical thinking:** The capability of using creative and critical thinking in respective areas
- **Analytical ability:** The ability to analyze issues and problems in all the disciplines
- **Problem-solving skills:** The capability towards solving problems
- **Entrepreneur skills:** The inclusion of leadership, business management, time management skills
- **Communication skills:** The ability to transfer complicated/technical information in a precise manner
- **Mutual and multidisciplinary competence:** The ability of teamwork in interdisciplinary fields
- **Digital literacy:** The capability of utilizing modern digital tools to carry out the simulation process
- **Moral and ethical awareness:** Ability to adopt moral ethics
- **Social responsibility:** Creating socially responsible citizens

III. 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.

IV. PROGRAMME OUTCOMES

1. Acquire scientific knowledge leading to creative thinking and research motivations.
2. Internalize the learned concepts and that will enable them to become skilled professionals.
3. Develop a sense of an interdisciplinary approach to identify and resolve issues through the project, seminars, fieldwork, internships, and industrial visits.
4. Become empowered individuals who will emerge as entrepreneurs or be employed in industry, academia, and Government sectors.
5. Establish a self-sustained environment for a healthy society.

V. PROGRAMME SPECIFIC OUTCOMES

PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline. After completing the B.Sc. Information Technology Programme, the graduates would have

1. Acquired the required knowledge in the Hardware and Software aspects of Computer Science domain and the art of programming.

2. Understood the development methodologies of software systems and the ability to analyze design and develop computer applications for real life problems.

3. Knowledge and skills to collaborate and communicate with peers for performance enhancement in IT / ITES industries.

4. Ability to understand, adjust and adapt with the dynamic technical environment for the growth of IT industry.

5. Capacity to transfer the skills gained, to provide innovative and novel solutions by maintaining ethical norms for the betterment of humane society.

VI. REGULATIONS

These regulations shall take effect from the academic year 2023-2024, i.e., for students who are to be admitted to the first year of the course during the academic year 2023-24 and thereafter.

1. Eligibility for Admission:

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

2. Duration of the Programme:

The course of study of Bachelor of Science in Information Technology shall consist of three academic years divided into six semesters with 140 credits. The Programme of study will comprise the course according to the syllabus.

3. Programme of Study:

The programme 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   : Cores, Generic / Discipline Specific Courses.

Part IV   : Skill Enhancement Courses (Non-Major Elective Courses)
              Enhancement Compulsory Courses.
              Foundation Course, Internship, Extension Activity, etc.

Extension Activity:

Every student shall participate compulsorily for period of not less than two years (4 semesters) in any one of the following programmes. NSS/ Sports/YRC/Other Extra-curricular and Co-curricular activities (Club/IIC/EDC). The student's performance shall be examined by the staff in-charge of extension activities along with the Head of the respective department and a senior member of the Department on the following parameters.

The marks shall be sent to the Controller of Examinations before the commencement of the final semester examinations.

20% of marks for Regularity of attendance.

60% of marks for Active Participation in classes/ camps/ games/ special Camps/ programmes in the college/ District/ State/ University activities.

10% of marks for Exemplary awards/ Certificates/ Prizes.

10% of marks for Other Social components such as Blood Donations, Fine Arts, etc.

The above activities shall be conducted outside the regular working hours of the college. The mark sheet shall carry the gradation relevant to the marks awarded to the candidates.

A - Exemplary - 80 and above

B - Very good - 70-79

C - Good - 60-69

D - Fair - 50-59

E - Satisfactory - 40 – 49

This grading shall be incorporated in the mark sheet to be issued at the end of the semester. (Handicapped students who are unable to participate in any of the above activities shall be required to take a test in the theoretical aspects of any one of the above fields and be graded and certified accordingly).

4. Examinations:

The programme of study shall be based on semester pattern with Internal Assessment under Choice Based Credit System.

The examinations for all the papers consist of both Internal (Continuous Internal Assessment - CIA) and External (End Semester) theory examinations. The theory examinations shall be conducted for three hours duration at the end of each semester. The candidates failing in any subjects(s) will be permitted to reappear for the same in the subsequent semester examinations.

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	M23UFTA01/ M23UFHI01	6	-	3	25	75	100
II	LANGUAGE COURSE-II	English –I	M23UFEN01	6	-	3	25	75	100
III	CORE COURSE-I	Programming In C	M23UIT01	5	-	5	25	75	100
	CORE PRACTICAL - I	Practical – I C Programming Lab	M23UITP01	-	3	3	40	60	100
	GENERIC ELECTIVE COURSE	Elective – I – Generic Elective – Discrete Mathematics - I	M23UMAGE2	6	-	5	25	75	100
IV	SKILL ENHANCEMENT COURSE	SEC – I NME - I Aptitude for Competitive Examinations -I	M23UMAN01	2	-	2	25	75	100
	FOUNDATION COURSE	Foundation Course - Fundamentals of Computer	M23UITFC1	2	-	2	25	75	100
		Total		27	3	23	190	510	700

SEMESTER: II

Part	Course Category	Title of the Course	Course Code	Hrs/Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil-II / Hindi-II / French-II	M23UFTA02/ M23UFHI02	6	-	3	25	75	100
II	LANGUAGE COURSE-II	English – II	M23UFEN02	6	-	3	25	75	100
III	CORE COURSE-II	Java Programming	M23UIT02	5	-	5	25	75	100
III	CORE PRACTICAL –II	Java Programming & Data Structures Lab	M23UITP02	-	3	3	40	60	100
III	GENERIC ELECTIVE COURSE	Elective – II – Generic Elective – Discrete Mathematics -II	M23UMAGE4	6	-	5	25	75	100
IV	SKILL ENHANCEMENT COURSE	SEC – II - NME - II	M23UMAN03	2	-	2	25	75	100
IV	SKILL ENHANCEMENT COURSE	Introduction to HTML	M23UITS01	2	-	2	25	75	100
		Total		27	3	23	190	510	700

Semester – III

Part	Course Category	Title of the Course	Course Code	Hrs/Week		No. of Credits	Max. Mark		
				L	P		Int.	Ext.	Total
I	LANGUAGE COURSE-I	Tamil-III / Hindi-III / French-III	M23UFTA03	6	–	3	25	75	100
II	LANGUAGE COURSE-II	English	M23UFEN03	6	–	3	25	75	100
III	CORE COURSE-III	Relational Database Management System	M23UIT03	6	–	5	25	75	100
III	CORE PRACTICAL – III	Practical III : RDBMS Lab	M23UITP03	–	3	3	40	60	100
III	GENERIC ELECTIVE COURSE	Generic Elective – III - Numerical Methods	M23UMAGE5	5	–	5	25	75	100
IV	SKILL ENHANCEMENT COURSE	SEC – IV Web Designing	M23UITS02	2	–		25	75	100
	SKILL ENHANCEMENT COURSE	SEC – V Multimedia Systems	M23UITS03	2	–	2	25	75	100
	Total			**27**	**3**	**23**	**190**	**510**	**700**

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 / Hindi-IV / French-IV	M23UFTA04	6	–	3	25	75	100
II	LANGUAGE COURSE-II	English	M23UFEN04	6	–	3	25	75	100
III	CORE COURSE - IV	.Net Programming	M23UIT04	4	–	4	25	75	100
III	CORE PRACTICAL – IV	Practical –IV- .Net Programming Lab	M23UITP04	–	3	3	40	60	100
III	GENERIC ELECTIVE COURSE	Generic Elective – IV – Optimization Techniques	M23UMAGE6	5	–	5	25	75	100
IV	SKILL ENHANCEMENT COURSE	SEC – VI - Biometrics	M23UITS04	2	–	2	25	75	100
	SKILL ENHANCEMENT COURSE	SEC – VII – Software Testing	M23UITS05	2	–	2	25	75	100
	Enhancement Compulsory	Environment Studies	M23UES01	2	–	2	25	75	100
	Total			**27**	**3**	**24**	**215**	**585**	**800**

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SEMESTER: V

Part	Course Category	Title of the Course	Course Code	L	P	No. of Credits	Int.	Ext	Total
III	Core Course- V	Python Programming	M23UIT05	6	–	4	25	75	100
III	core course- VI	Operating Systems	M23UIT06	6	–	4	25	75	100
III	CORE PRACTICAL- V	Practical –V- Python Programming Lab	M23UITP05	–	5	4	25	75	100
III	DISCIPLINE SPECIFIC ELECTIVE COURSE - I	Elective - I	M23UITDSE3	6	–	3	25	75	100
III	DISCIPLINE SPECIFIC ELECTIVE COURSE - II	Elective - II	M23UITDSE4	5	–	3	25	75	100
IV	VALUE EDUCATION	Value Education - Yoga	M23UVE01	2		2	25	75	100
IV	CORE INTERNSHIP	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	M23UITIS01	–	–	2	40	60	100
	Total			25	5	22	190	510	700

SEMESTER: VI

Part	Course Category	Title of the Course	Course Code	L	P	No. of Credits	Int.	Ext.	Total
III	CORE COURSE-VII	Data Communication and Networking	M23UIT07	6	–	4	25	75	100
III	CORE COURSE-VIII	Data Mining	M23UIT08	5	–	4	25	75	100
III	CORE PRACTICAL –VI	Practical-VI- .Data Mining Lab	M23UITP06	–	5	4	40	60	100
III	DISCIPLINE SPECIFIC ELECTIVE COURSE - III	Elective - III	M23UITDSE8	4	–	3	25	75	100
III	DISCIPLINE SPECIFIC ELECTIVE COURSE - IV	Elective - IV	M23UITDSE12	4	–	3	25	75	100
III	PROJECT	PROJECT with Viva Voce	M23UITPR1	4	–	4	40	60	100
IV	SKILL ENHANCEMENT COURSE	Professional Competency Skill Enhancement	M23UITPCS1	2	–	2	25	75	100
IV	Extension Activity	Extension Activity	M23UEX01	–	–	1	–	–	–
	Total			25	5	25	205	495	700
	TOTAL			150	30	140	1180	3120	4300

The students will gain extra credits for successful completion of online courses from SWAYAM / MOOC.

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 Courses – I	3	3	3	3	–	–	12	24	04	400
II	Language Courses– II	3	3	3	3	–	–	12	24	04	400
III	Core courses	5	5	5	4	8	8	35	43	08	800
	Core Practical	3	3	3	3	4	4	20	22	06	600
	Discipline Specific Elective Courses	–	–	–	–	6	6	12	19	04	400
	Project/Internship					2	4	6	04	02	200
	Generic Elective Courses	5	5	5	5	–	–	20	22	04	400
IV	SEC	–	2	4	4	–	2	12	12	06	600
	Foundation Course	2	–	–	–	–	–	02	02	01	100
	SEC (NME)	2	2	–	–	–	–	04	04	02	200
	E C C	–	–	–	2	2	–	04	04	02	200
V	Extension Activities	–	–	–	–	–	01	01	–	–	–
		–	–	–	–	–	–	–	–	–	–
TOTAL		**23**	**23**	**23**	**24**	**22**	**25**	**140**	**180**	**43**	**4300**

GENERIC ELECTIVE COURSE SUBJECTS FOR B.Sc., Information Technology STUDENTS

Semester	Subject	Course Code
I	GEC – I – DISCRETE MATHEMATICS – I	M23UMAGE2
II	GEC – II – DISCRETE MATHEMATICS – II	M23UMAGE4
III	GEC – III – NUMERICAL METHODS	M23UMAGE5
IV	GEC – IV - OPTIMIZATION TECHNIQUES	M23UMAGE6

DISCIPLINE SPECIFIC ELECTIVE SUBJECTS FOR B.Sc. Information Technology STUDENTS

Semester	ELECTIVE – I	
	Course Title	**Course Code**
	Natural Language Processing	M23UITDSE1
	Artificial Neural Network	M23UITDSE2
	Cryptography	**M23UITDSE3**
	ELECTIVE – II	
	Human Computer Interaction	M23UITDSE4
V	Artificial Intelligence	M23UITDSE5
	Analytics for Service Industry	**M23UITDSE6**
	ELECTIVE - III	
	Course Title	**Course Code**
	Fuzzy Logic	M23UITDSE7
	Big Data Analytics	**M23UITDSE8**
	Computational Intelligence	M23UITDSE9
	ELECTIVE – IV	
VI	Grid Computing	M23UITDSE10
	Trends in Computing	M23UITDSE11
	IOT and its Applications	**M23UITDSE12**

SKILL ENCHANCEMENT COURSES (SEC – 1 - SEC – 5)

Course Title	Course Code
Introduction to HTML	M23UCSS01
PHP Programming	M23UCSS02
Multimedia Systems	M23UCSS03
Biometrics	M23UCSS04
Web Designing	M23UCSS05

ENHANCEMENT COMPULSORY COURSES

Semester	Course Title	Course Code
IV	ECC- I- Environmental studies	M23UES01
V	ECC- II -Value Education – Yoga	M23UVE01

VI. SCHEME OF EXAMINATIONS

1. Question Paper Pattern for Theory Examination

Time: Three Hours   Maximum Marks: 75

Knowledge Level	Sections		Marks	Total Marks	Meaning of K's
K1	**Part - A** 10 Questions - Objectives type *1 Marks (No Choice)	Two Questions from each unit	**10**	**75**	K1- Memory Level K2 - Understanding Level K3 - Application Level K4 - Analytical Level
K1, K2	**Part - B** 5 Questions *2 Marks (No Choice)	One Question from each unit	**10**		
K2, K3	**Part - C** 5 Questions (either or type) * 5 Marks	One Question from each unit	**25**		
K2, K3, K4	**Part - D** 3 out of 5 Questions *10 Marks	One Question from each unit	**30**		

2. Question Paper Pattern for Practical Examination

Time: Three Hours   Maximum Marks: 60

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

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

       b. b) From the list of practical's 4 and 5.

               (AND)

       c. a) From the list of practical's 6, 7 and 8 (or)

       d. 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 / Internship/ Project papers of UG programmes.

ESE	CIA Total	EA Total	Total Marks Allotted	Passing Minimum for EA	Passing Minimum (ESE)
Theory	25	75	100	30	40
Practical	40	60	100	24	40
Project	40	60	100	24	40
Internship	100	60	100	24	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
Marks Attendance	: 05 Marks

Total	: 25 Marks

PRACTICAL

EVALUATION OF INTERNAL ASSESSMENT

Test	: 20 Marks
Attendance	: 10 Marks
Record	: 10 Marks

Total :	40 Marks

PROJECT

EVALUATION OF INTERNAL ASSESSMENT

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

Total :	40 Marks
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4. **Passing Minimum:**

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Theory Exam mark) with minimum of 30 marks (out of 75 marks) in the End Semester Theory Examinations.

The Candidates shall be declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 24 marks (out of 60 marks) in the End Semester Practical Examinations.

5. **Submission of Record Note Books for Practical Examinations**

Candidates appearing for practical examinations should

submit a bonafide 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. Internship/Project:

Internship

Internship training (Minimum two weeks period) for the UG programmes during second year vacation period.

The Internship training Report should be valued for 60 marks by an External examiner; however the Viva-Voce examination should conducted by both the external examiner appointed by the College and the internal examiner / guide/ teacher concerned..

a. The Internship training Report may consist of minimum of 30 pages.

b. The candidate must submit the Internship training Report 20 days before the commencement of the V Semester Examinations.

Project:

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

The project should be valued 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/ teacher concerned.

1. The Project Report may consist of minimum of 60 pages.

2. The candidate must submit the Project Report 10 days before the commencement of the IV Semester Examinations.

3. A candidate who fails in the Project/Dissertation or is absent may resubmit the report, on the same topic, with necessary modification / correction / improvements in the subsequent Even Semester Examinations for evaluation and shall undergo viva-voce Examination.

VII. NOTE

a) SWAYAM / MOOC – Free Online Course

SWAYAM / MOOC is 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) Value Added 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 credits.

Core Course- I	B.Sc. Information Technology	Credits :5
Course code: M23UIT01	**PROGRAMMING IN C**	Contact Hours per week : 5

Objectives

- To familiarize the students with the understanding of code organization
- To improve the programming skills
- To learning the basic programming constructs.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss the fundamental concepts of C programming languages, and its features	K2
CO2	Demonstrate the programming methodology.	K3
CO3	Identify suitable programming constructs for problem solving.	K1
CO4	Categorize the appropriate data representation, control structures, functions and concepts Based on the problem requirement.	K4
CO5	Evaluate the program performance by fixing the errors.	K3

UNIT I   15 Hours

Studying Concepts of Programming Languages- Language Evaluation Criteria - Language design - Language Categories - Implementation Methods – Programming Environments - Overview of C: History of C- Importance of C- Basic Structure of C Programs-Executing a C Program- Constants, Variables and Data types - Operators and Expressions - Managing Input and Output Operations

UNIT II   15 Hours

Decision Making and Branching: Decision Making and Looping - Arrays - Character Arrays and Strings.

UNIT III   15 Hours

User Defined Functions: Elements of User Defined Functions- Definition of Functions- Return Values and their Types- Function Call- Function Declaration- Categories of Functions- Nesting of Functions- Recursion

UNIT IV   **15 Hours**

   Structures and Unions: Introduction- Defining a Structure- Declaring Structure Variables Accessing Structure Members- Structure Initialization- Arrays of Structures- Arrays within Structures- Unions- Size of Structures.

UNIT V   **15 Hours**

   Pointers: Understanding Pointers- Accessing the Address of a Variable- Declaring Pointer Variables- Initializing of Pointer Variables- Accessing a Variable through its Pointer- Chain of Pointers- Pointer Expressions- Pointer and Scale Factor- Pointer and Arrays- Pointers and Character Strings- Array of Pointers- Pointer as Function Arguments- Functions Returning Pointers- Pointers to Functions- File Management in C.

Text Books				
S.No	**Author**	**Title of the book**	**Publisher**	**Year of publication**
1.	Robert W. Sebesta	Concepts of Programming Languages	‖, Fourth Edition, Addison Wesley	2012
2.	E Balagurusamy	Programming in ANSI C,	Tata McGraw Hill	2008
Reference Books				
1.	Ashok Nkamthane	Programming with ANSI and Turbo C	Pearson Education	2009
2.	Byron Gottfried	Programming with C‖, Schaums Outline Series	Tata McGraw Hill Publications	2010

Mapping with Programme Specific Outcomes

CO's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

Core Practical - I	B.Sc. Information Technology	Credits :3
Course code: M23UITP01	C PROGRAMMING LAB	Contact Hours per week : 3

Objectives

- To the Course aims to provide exposure to problem-solving through C programming
- To aims to train the student to the basic concepts of the C - Programming language
- To apply different concepts of C language to solve the problem

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the understanding of syntax and semantics of C programs.	
CO2	Identify the problem and solve using C programming techniques.	
CO3	Identify suitable programming constructs for problem solving.	K3 & K4
CO4	Analyze various concepts of C language to solve the problem in an efficient way.	
CO5	Develop a C program for a given problem and test for its correctness.	

List of Practical's

1. Programs using Input/ Output functions
2. Programs on conditional structures
3. Command Line Arguments
4. Programs using Arrays
5. String Manipulations
6. Programs using Functions
7. Recursive Functions
8. Programs using Pointers
9. Files
10. Programs using Structures & Unions

Foundation Course	B.Sc. Information Technology	Credits : 2
Course code: M23UITFC1	**FUNDAMENTALS OF COMPUTERS**	Contact Hours per week :2

Objectives

- To analyze a problem with appropriate problem solving techniques
- To understand the main principles of imperative, functional and logic oriented programming languages
- To increase the ability to learn new programming languages.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the Computer fundamentals and various problem solving concepts in Computers.	K2
CO2	Apply the basic computer organization, software, computer languages, software development life cycle and the need of structured programming in solving a computer problem.	K3
CO3	Identify the types of computer languages, software, computer problems and examine how to set up expressions and equations to solve the problem.	K1
CO4	Restate the most appropriate programming languages, constructs and features to solve the problems in diversified domains.	K2
CO5	Analyze the design of modules and functions in structuring the solution and various Organizing tools in problem solving.	K4

UNIT I   **6 Hours**

Introduction: Characteristics of Computers - Evolution of Computers **Basic Computer Organization:** I/O Unit - Storage Unit - Arithmetic Logic Unit - Control Unit - Central Processing Unit.

UNIT II   **6 Hours**

Computer Software: Types of Software - System Architecture **Computer Languages:** Machine Language - Assembly Language - High Level Language - Object Oriented Languages

UNIT III   **6 Hours**

      Problem Solving Concepts: Problem Solving in Everyday life - Types of Problems - Problem solving with computers - Difficulties with Problem Solving.

UNIT IV   **6 Hours**

      Problem Solving concepts for the computer: Constant Variables - Data Types - Functions -Operators - Expressions and Equations - **Organizing the Solution:** Analyzing the problem - Algorithm - Flowchart - Pseudo code.

UNIT V   **6 Hours**

      Programming Structure: Structuring a solution - Modules and their function - Local and Global variables - Parameters - Return values - Sequential Logic Structure - Problem solving with Decision - Problem Solving with Loops earch. **Recursive algorithms**: Towers of Hanoi – Permutation generation

Text Books				
S.No	Author	Title of the book	Publisher	Year of publication
1.	Pradeep K. Sinha and PritiSinha	Computer Fundamentals‖, Sixth Edition,	BPB Publications	2004
2.	Maureen Sprankle and Jim Hubbard	Problem Solving and Programming Concept	Ninth Edition, Prentice Hall	2009
Reference Books				
1.	R.G. Dromey	How to Solve it by Computer	Prentice Hall International Series in Computer Science.	2007
2.	C. S. V. Murthy	Fundamentals of Computers	Third Edition, Himalaya Publishing House	2009

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

Core Course	B.Sc. Information Technology	Credits : 5
Course code: M23UIT02	JAVA PROGRAMMING	Contact Hours per week : 5

Objectives

- To provide knowledge on fundamentals of object-oriented programming to have the ability.
- To use the SDK environment to create, debug and run servlet programs.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basic terminologies of OOP, programming language techniques, JDBC and Internet programming concepts	K1
CO2	Solve problems using basic constructs, mechanisms, techniques and technologies of Java	K2
CO3	Analyse and explain the behaviour of simple programs involving different techniques such as Inheritance, Packages, Interfaces, Exception Handling and Thread and technologies such as JDBC and Servlets	K3
CO4	Perform various problem-solving strategies involved in Java to develop a high-level application.	K3
CO5	Design GUI based JDBC applications and able to develop Servlets using suitable OOP concepts and techniques	K4

UNIT I   **15 Hours**

Fundamentals of Object- Oriented Programming: Introduction – Object Oriented Paradigm – Concepts of Object – Oriented Programming – Benefits of OOP–**Evolution:** Java History – Java Features – Differs from C and C++ - Overview of Java Language: Java Program – Structure – Tokens – Java Statements – Java Virtual Machine – Command Line Arguments.

UNIT II   **15 Hours**

Constants, Variables and Data Types: – Operators and Expressions – Decision making and Branching – Looping – Arrays - Strings – Collection Interfaces and classes.

UNIT III   **15 Hours**

Classes objects and methods: Introduction – Defining a class – Method Declaration –Constructors - Method Overloading – Static Members – Nesting of methods – Inheritance –Overriding– Final variables and methods– Abstract methods and classes.

UNIT IV   **15 Hours**

Multiple Inheritance: Defining Inter faces – Extending Interfaces – Implementing Interfaces – **Packages:** Creating Packages – Accessing Packages – Using a Package – Managing Errors and Exceptions – Multithreaded Programming.

UNIT V   **15 Hours**

Layout Managers -JDBC – Java Servlet: - Servlet Environment Role – Servlet API –Servlet Life Cycle –Servlet Context–HTTP Support–HTML to Servlet Communication.

Text Books				
S.No	**Author**	**Title of the book**	**Publisher**	**Year of publication**
1.	E Balagurusamy	Programming with Java	Tata McGraw Hill Edition India Private Ltd, 4th Edition	2010
2.	C Xavier	Java Programming – A Practical Approach	Tata Mc Graw Hill Edition Private Ltd	2012
Reference Books				
1.	P.Naughton and H.Schildt	Java2 The Complete Reference	TMH, 3rdEdition	1999
2.	Jaison Hunder & William Crawford	Java Servlet Programming	O'Reilly	2002
3.	Jim Keogh	J2EE: The Complete Reference	Tata McGraw Hill Edition.	2002

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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 – II

Core Practical - I	B.Sc. Information Technology	Credits : 3
Course code: M23UITP02	**JAVA PROGRAMMING & DATA STRUCTURES LAB**	**Contact Hours per week : 3**

Objectives

- To design and develop applications using different Java programming language.
- To organize and manipulate the data with the help of fundamental data structures

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and explain the way of solving the simple problems	
CO2	Discuss the appropriate software development environment to write, compile and execute object-oriented Java programs	
CO3	Analyze and identify necessary mechanisms of Java needed to solve real-world Problem	**K3 & K4**
CO4	Compare defects and validate a Java program with different inputs	
CO5	Design, develop and compile Core Java , GUI , JDBC and servlet applications utilize OOP and data structure concepts	

List of Practical's

1. Basic Programs
2. Arrays
3. Strings
4. Array List, Hash Set and Vector collection classes
5. Classes and Objects
6. Interfaces
7. Inheritance
8. Packages
9. Exception Handling
10. Threads
11. Linked List
12. Stacks

13. Queue
14. Sorting
15. Binary Tree Representation
16. Working with Database using JDBC
17. Web application using Servlet

SEC - III	B.Sc. Information Technology	Credits : 2
Course code: M23UITS01	SEC-III- INTRODUCTION TO HTML	Contact Hours per week :2

Objectives

- ➢ To insert a graphic within a web page.
- ➢ To create a link within a web page.
- ➢ To create a table within a web page.
- ➢ To insert heading levels within a web page.
- ➢ To insert ordered and unordered lists within a web page.
- ➢ To create a web page.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concept in HTML Concept of resources in HTML	K1
CO2	Demonstrate the concept of Meta Data Understand the concept of saves the files.	K3
CO3	Choose the page formatting, Concept of list	K4
CO4	Apply the concept of creating link to email address	K3
CO5	Design the concept of adding images understand the table creation.	K2

UNIT I   **6 Hours**

  Introduction: Web Basics: What is Internet – Web browsers – What is Web page – HTML Basics: Understanding tags.

UNIT II   **6 Hours**

  Tags for Document structure (HTML, Head, Body Tag). **Block level text elements:** Headings paragraph (tag) – **Font style elements:** (bold, italic, font, small, strong, strike, big tags)

UNIT III   **6 Hours**

  Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR- Using Images – Creating Hyperlinks.

UNIT IV   **6 Hours**

  Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan –Cell padding

UNIT V 6 Hours

     Frames: Frameset – Targeted Links – No frame – Forms: Input, Textarea, Select, Option.

Text Book				
S.No	**Author**	**Title of the book**	**Publisher**	**Year of publication**
1.	TeachU	Mastering HTML5 and CSS3 Made Easy	Comp Inc	2014

Mapping with Programme Outcomes:

CO's/ PSO's	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	M	S
CO2	M	S	S	M	S
CO3	S	M	M	S	S
CO4	S	S	S	S	M
CO5	M	S	S	M	S

   S-Strong   M-Medium

Core Course - III	B.Sc. Information Technology	Credits : 5
Course code: M23UIT03	Relational Database Management Systems	Contact Hours per week : 6

Objectives

➢ To understand the basic DBMS models and architecture.
➢ To learn how to query and normalize the database.
➢ To study the data base design, transaction Processing and Management and Security Issues.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the fundamental RDBMS concepts and PL/SQL.	K1
CO2	Apply database operations, mapping, normalization, SQL and PL/SQL.	K2
CO3	Analyze the requirements to implement relational database concepts.	K3
CO4	Evaluate the database based on various models and normalization.	K3
CO5	Design and construct normalized tables and manipulate it effectively using SQL and PL/SQL database objects.	K4

UNIT I 18 **Hours**

Introduction to Databases: Introduction – Characteristics of the Database Approach – Actors on the Scene – Workers behind the scene – Advantages of using DBMS Approach. **Overview of database and Architectures:** Data Models, Schemas, and Instances – Three-schema Architecture and Data Independence – Database languages & Interfaces – Database System Environment– Centralized & Client Server Architecture for DBMS - Classification of DBMS.

UNIT II 18 **Hours**

Basic Relational Model: Relational Model Concepts – Relational Model Constraints and Relational Database Schemas – Update Operations, Tractions, Dealing with Constraint Violations – **Formal Relational Languages**: Unary Relational Operations: SELECT and PROJECT – Relational Algebra Operations

from Set Theory – **Binary Relational Operations:** JOIN and DIVISION – Examples of Queries in Relational Algebra.

UNIT III   **18 Hours**

     Conceptual Data Modeling using the ER Model: Using High-Level Conceptual Data Models for Database Design – An example DB application – Entity Types, Entity Sets, Attributes, and Keys – Relationship Types, Relationship sets, Roles, and Structural Constraints – Weak entity types – Example- **Mapping a Conceptual Design into Logical Design:** Relational Database Design using ER- Relational Mapping – 15 Mapping EER Model Constructs to Relations.

UNIT IV   **18 Hours**

     Functional Dependencies and Normalization for Relational Database: Functional Dependencies – Definition of Functional Dependency – Normal Forms based on Primary Keys – Normalization of Relations – First Normal Form – Second Normal Form – Third Normal Form – BCNF- Fourth Normal Form- Fifth Normal Form.

UNIT V   **18 Hours**

     SQL: The Relational Database Standard: Data definition, Constraints, and schema changes in SQL – Basic Queries in SQL – More complex SQL Queries – Insert, delete and update statements in SQL – Views in SQL. **PL/SQL:** Introduction to PL/SQL – More on PL/SQL – Error Handling in PL/SQL – Oracles Named Exception Handlers – Stored Procedures and Functions – Execution of Procedures and Functions – Advantages – Procedures Vs. Functions – Syntax for Creating Procedures and Functions – Deleting a Stored Procedure or Function – Oracle Packages – Database Triggers – Types Of Triggers – Deleting a Trigger – Raise-Application Error Procedure.

Text Books				
S.No	**Author**	**Title of the book**	**Publisher**	**Year of publication**
1.	Ramez Elmasri, Shamkant B.Navathe	Database Systems	Pearson Education, New Delhi	Sixth edition 2014
2.	Ivan Bayross	SQL, PL/SQL-The Programming Language of Oracle	BPB Publications, New Delhi	Second Revised Edition 2003
Reference Book				
1.	Abraham Silberschatz, Henry F.Korth, S.Sudarshan	Database System Concepts	Tata McGraw Hill Publication	4th Edition

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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 – III

Core Practical - III	**B.Sc. Information Technology**	**Credits : 3**
Course code: M23UITP03	**Practical – III RDBMS LAB**	**Contact Hours per week : 3**

Objectives

- To learn and implement SQL & PL/SQL

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Choose appropriate SQL queries and PL/SQL blocks for the database.	**K3 & K4**
CO2	Implement SQL and PL/SQL blocks for the given problem effectively.	
CO3	Analyse the problem and Exceptions using queries and PL/SQL blocks	
CO4	Validate the database for normalization using SQL and PL/SQL blocks.	
CO5	Design Database tables create Procedures, user-defined functions and Triggers.	

List of Practical's

SQL

1. DDL Commands
2. DML Commands
3. DCL Commands
4. SQL Built-in functions
5. Using Sub Queries

PL/SQL

6. Simple programs using PL/SQL
7. Procedures
8. User-defined functions
9. Exception Handling
10. Triggers

SEC- IV	B.Sc. Information Technology	Credits : 2
Course code: M23UITS02	SEC – IV WEB DESIGNING	Contact Hours per week : 2

Objectives

➢ To understand the basics of HTML and its components.
➢ To study about the Graphics in HTML.
➢ To understand and apply the concepts of XML and DHTML
➢ To understand the concept of JavaScript
➢ To identify and understand the goals and objectives of the Ajax

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Develop working knowledge of HTML.	K1
CO2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	K2
CO3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	K3
CO4	Ability to develop a java script.	K3
CO5	An ability to develop web application using Ajax	K4

UNIT I   **6 Hours**

HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment links-tables-frames.

UNIT II   **6 Hours**

Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.

UNIT III   **6 Hours**

XML & DHTML: Cascading style sheet (CSS)-what is CSSWhy we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML).

UNIT IV   **6**

Dynamic HTML: Document object model (DCOM)- Accessing HTML & CSS through DCOM Dynamic content styles & positioning-Event bubbling-data binding. **JavaScript:** Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.

UNIT V   **6 Hours**

Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.

Text Books				
S.No	Author	Title of the book	Publisher	Year of publication
1.	Pankaj Sharma	Web Technology	SkKataria & Sons Bangalore	2011
2.	Mike Mcgrath	Java Script	Dream Tech Press	2006, 1st Edition
3.	Achyut S Godbole & AtulKahate	Web Technologies	-	2002, 2nd Edition
Reference Book				
1.	Laura Lemay, Rafe Colburn , Jennifer Kyrnin	Mastering HTML, CSS & Java script	Web Publishing	4th Edition

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

SEC -V	B.Sc. Information Technology	Credits : 2
Course code: M23UITS03	SEC – V Multimedia Systems	Contact Hours per week : 2

Objectives

- ➢ To understand the basics of Multimedia.
- ➢ To study about the Image File Formats, Sounds Audio File Formats.
- ➢ To understand the concepts of Animation and Digital Video Containers.
- ➢ To study about the Stage of Multimedia Project
- ➢ To understand the concept of Ownership of Content Created for Project Acquiring Talent.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts, importance, application and the process of developing multimedia	K1
CO2	To have basic knowledge and understanding about image related processings.	K2
CO3	To understand the framework of frames and bit images to animations	K3
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	K3
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing.	K4

UNIT I   **6 Hours**

    Multimedia Definition-Use Of Multimedia Delivering Multimedia- Text: About Fonts and Faces - Using Text in Multimedia -Computers and Text Font Editing and Design Tools Hypermedia and Hypertext.

UNIT II   **6 Hours**

    Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images - Color - Image File Formats. **Sound:** The Power of Sound –Digital Audio-Midi Audio Midi vs. Digital Audio-Multimedia System Sounds Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project

UNIT III   **6 Hours**

    Animation: The Power of Motion-Principles of Animation-Animation by

Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays Digital Video Containers-Obtaining Video Clips –Shooting and Editing Video.

UNIT IV **6 Hours**

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs -The Hardware Needs - The Software Needs - An Authoring Systems Needs Multimedia Production Team.

UNIT V **6 Hours**

Planning and Costing: The Process of Making Multi media-Scheduling-Estimating - RFPs and Bid Proposals. Designing and Producing - **Content and Talent:** Acquiring Content Ownership of Content Created for Project Acquiring Talent.

Text Book				
S.No	Author	Title of the book	Publisher	Year of publication
1.	TayVaughan	Multimedia: Making It Work	Osborne/Mc Graw Hill	8thEdition 2001
Reference Book				
1.	Ralf Steinmetz & Klara	Multimedia Computing, Communication & Applications Nahrstedt	Pearson Education	2012

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

Core Course - IV	B.Sc. Information Technology	Credits : 4
Course code: M23UIT04	.NET PROGRAMMING	Contact Hours per week : 4

Objectives

- To provide sufficient knowledge in developing web applications using C# and ASP.NET.
- To manipulate data from SQL Server using Microsoft ADO.NET.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the features of C# programming language and ASP.NET applications	K1
CO2	Demonstrate the salient properties of C# and ASP.NET applications	K2
CO3	Identify the various stages in developing a web forms.	K3
CO4	Select the appropriate controls to create a web form.	K3
CO5	Recommend a data driven web application by connecting to the data sources	K4

UNIT I 12 Hours

The Creation of C#: C# Relates to the .Net Framework - Common Language Runtime - Managed vs unmanaged code - An Overview of C#: Object-Oriented Programming - First Simple Program-Handling Syntax errors - Using code blocks-semicolon, positioning and Indentation-The C# Keywords-Identifiers-The .Net Framework Class Library-Data Types, Literals and Variables- Operators.

UNIT II 12 Hours

Program Control Statements: If Statement- switch Statement-For Loop-While loop do-while loop- for each loop-using break to exit a loop using continue- go to- **Introducing Classes and objects**: Class Fundamentals-objects creation-Methods-constructors-Garbage Collection and Destructors-Exception Handling.

UNIT III   12 Hours

      Arrays and Strings: Arrays-Multidimensional Arrays-Jagged Arrays for each loop Strings- **Methods and classes**: Method overloading- Main Method-Recursion-static Classes Delegates, **Events and Lambda Expressions:** Delegates -Lambda Expressions-LINQ.

UNIT IV   12 Hours

      Developing ASP.NET Applications: Visual Studio: Creating Websites The Anatomy of a Web Form – **Web Form Fundamentals**: Converting HTML Page to an ASP.Net Page – Page Class – Web Controls. **State Management**: View State - Transferring Information between Pages – Cookies – Session State – Application State.

UNIT V   12 Hours

      Validation Controls – Ad Rotator Control. **Working with Data**: **ADO.NET Fundamentals:**– Direct Data Access – Disconnected Data Access - **Data Binding**: Data Binding with ADO.NET –Data Source Controls - **The Data Controls**: The Grid View – Formatting the Grid View – Selecting Grid View Row – Editing, Sorting and Paging the Grid View Generating Crystal Reports.

Text Books				
S.No	Author	Title of the book	Publisher	Year of publication
1.	Herbert Schildt	C# 4.0 The Complete Reference	Tata McGraw-Hill Pvt Ltd	2010
2.	Mathew MacDonald	Beginning ASP.NET 4 in C#	Apress	Second Edition 2010
Reference Books				
1.	Greg Buczek	ASP.NET – Developer_s guide	Tata MaGraw Hill Publication	2002
2.	Jesse Liberty	Programming C#, 3.0	O_Reilly Press	2009
3.	J.Sharp	Microsoft Visual C# Step by Step	PHI Learning Private Ltd	2008
4.	Christian Nagel et al	Professional C# 2005 with .NET 3.0	Wiley India	2007

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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 – IV

Core Practical - IV	B.Sc. Information Technology	Credits : 3
Course code: M23UITP04	.NET PROGRAMMING LAB	Contact Hours per week : 3

Objectives
- To provide sufficient knowledge in developing web applications and to manipulate data from SQL Server using Microsoft ADO.NET.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate MS Visual Studio.NET IDE to Create applications..	
CO2	Apply C# and ASP.NET concepts to design applications..	
CO3	Simplify the functionality of the web application in accordance to the user Requirement.	**K3 & K4**
CO4	Evaluate the web application to fix the errors..	
CO5	Build a web application using C# and ASP.NET concepts to solve the problem	

List of Program's

1. C# Basics
2. . Looping Constructs
3. Arrays & Jagged Array
4. Strings
5. Classes and Objects
6. Method overloading
7. Delegates
8. LINQ
9. Lambda Expressions

SEC - VI	B.Sc. Information Technology	Credits : 2
Course code: M23UITS04	SEC – VI BIOMETRICS	Contact Hours per week : 2

Objectives

- ➢ To identify the various biometric technologies.
- ➢ To design of biometric recognition.
- ➢ To develop simple applications for privacy.
- ➢ To understand the need of biometric in the society
- ➢ To understand the scope of biometric techniques

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To understand the basic concepts and the functionality of the Biometrics, Face Biometrics, Types, Architecture and Applications	K1
CO2	To know the concepts Retina and Iris Biometrics and Vein and Fingerprint Biometrics.	K2
CO3	To analyse the Privacy Enhancement and Multimodal Biometrics	K3
CO4	To get analytical idea on Watermarking Techniques.	K3
CO5	To Gain knowledge on Future scope of Biometrics, and Study of various Biometric Techniques	K4

UNIT I   6 Hours

Introduction: What is Biometrics, History, Types of biometric Traits, General architecture of biometric systems, Basic working of biometric matching, Biometric system error and performance measures, Design of biometric system, Applications of biometrics, Biometrics versus traditional authentication methods. **Face Biometrics:** Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face

Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, .7 Face Recognition Methods, Advantages and Disadvantages.

UNIT II 6 Hours

Retina and Iris Biometrics: Introduction, Performance of Biometrics, Design of Retina Biometrics, Design of Iris Recognition System, Iris Segmentation Method , Determination of Iris Region, Determination of Iris Region, Applications of Iris Biometrics, Advantages and Disadvantages.

Vein and Fingerprint Biometrics: Introduction, Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages.

UNIT III 6 Hours

Privacy Enhancement Using Biometrics: Introduction, Privacy Concerns Associated with Biometric Deployments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics. **Multimodal Biometrics:** Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics, Characteristics and Advantages of Multimodal Biometrics.

UNIT IV 6 Hours

Watermarking Techniques: Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking 6 CO4 Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Attacks on Spatial Domain Watermarking.

UNIT V 6 Hours

Scope and Future: Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics, Biometrics and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometrics, Radio Frequency Identification (RFID) Biometrics, DNA Biometrics, Comparative Study of Various Biometric Techniques. **Biometric Standards:** Introduction, Standard Development Organizations, Application Programming Interface (API), Information Security and Biometric Standards, Biometric Template Interoperability.

Text Book				
S.No	Author	Title of the book	Publisher	Year of publication
1.	G.R Sinha and Sandeep	Biometrics: Concepts and Applications	Wiley	2013

	B.Patil			

Reference Book

1.	Ruud M. SharathPankanti, Nalinik.Ratha, Andrew W.Senior, Jonathan H. Connell Bolle	Guide to Biometrics	Springer	2009

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

SEC - VII	B.Sc. Information Technology	Credits : 2
Course code: M23UITS05	SEC –VII Software Testing	Contact Hours per week : 2

Objectives

- ➢ To study fundamental concepts in software testing.
- ➢ To discuss various software testing issues and solutions in software unit test, integration and system testing..
- ➢ To study the basic concept of Data flow testing and Domain testing.
- ➢ To Acquire knowledge on path products and path expressions

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Students learn to apply software testing knowledge and engineering methods.	K1
CO2	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.	K2
CO3	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods).	K3
CO4	Have basic understanding and knowledge of contemporary issues in software testing, such as component-based software testing problems.	K4
CO5	Have an ability to use software testing methods and modern software testing tools for their testing projects.	K1

UNIT I   **6 Hours**

    Introduction: Purpose–Productivity and Quality in Software– Testing Vs

Debugging–Model for Testing– Bugs–Types of Bugs – Testing and Design Style.

UNIT II **6 Hours**

Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.

UNIT III **6 Hours**

Data Flow Testing Strategies - **Domain Testing:** Domains and Paths – Domains and Interface Testing.

UNIT IV **6 Hours**

Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing – Formats–Test Cases.

UNIT V **6 Hours**

Logic Based Testing–Decision Tables– Transition Testing–States, State Graph, State Testing.

Text Books				
S.No	**Author**	**Title of the book**	**Publisher**	**Year of publication**
1.	B.Beizer	Software Testing Techniques	Dream Tech India, NewDelhi	2003
2.	K.V.K.Prasad	Software Testing Tools	Dream Tech India, New Delhi	2005
Reference Books				
1.	Burnstein	Practical Software Testing	Springer International Edn	2003
2.	E. Kit	Software Testing in the Real World: Improving the Process	Pearson Education, Delhi	1995
3.	R.Rajani, and P.P.Oak	Software Testing	Tata Mc graw Hill, New Delhi	2004

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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 – V

Core Course – V	B.Sc. Information Technology	Credits : 4
Course code: M23UIT05	**PYTHON PROGRAMMING**	**Contact Hours per week : 6**

Objectives

- To make students understand the concepts of Python programming.
- To apply the OOPs concept in PYTHON programming.
- To impart knowledge on demand and supply concepts.
- To make the students learn best practices in PYTHON programming
- To know the costs and profit maximization.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs	K2
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	K3
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	K5
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	K3

UNIT I   15 Hours

Basics of Python Programming: History of Python-Features of Python- Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types- Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. Python Arrays: Defining and Processing Arrays – Array methods.

UNIT II   15 Hours

Control Statements: Selection/Conditional Branching statements: if, if- else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.

UNIT III   15 Hours

Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace –Defining our own modules.

UNIT IV   15 Hours

Lists: Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples**. Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods -Difference between Lists and Dictionaries.

UNIT V   15 Hours

Python File Handling: Types of files in Python - Opening and Closing files- Reading and Writing files: write() and writelines() methods- append() method– read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.

Text Books				
S.No	Author	Title of the Book	Publisher	Year of Publications
1.	Reema Thareja,	Python Programming using problem solving approach	Oxford University Press,	2017
2.	Dr. R. Nageswara Rao	Core Python Programming	First Edition Dream tech Publishers.	2017

Reference Books

1.	Vamsi Kurama	Python Programming A Modern Approach	Pearson Education	2018
2.	Mark Lutz	Learning Python	O rielly	2018
3.	Fabio Nelli	Python Data Analytics"	APress	2019

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

Core Course - VI	B.Sc. Information Technology	Credits : 4
Course code: M23UIT06	OPERATING SYSTEMS	Contact Hours per week : 6

Objectives

- To provide an introduction to the internal operation of modern operating systems.
- To focus on the core concepts such as processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the fundamental concepts of an OS and their respective functionality.	K1
CO2	Illustrate the importance of open source operating system commands.	K4
CO3	Identify and stimulate management activities of operating system.	K3
CO4	Analyze the various services provided by the operating system.	K2
CO5	Interpret different problems related to Process, Scheduling, Deadlock, memory and Files.	K3

UNIT I   18 Hours

Introduction: Definition of Operating System - **OS Structures**: OS Services - System Calls - Virtual Machines - **Process Management**: Process Concept - Process Scheduling - Operation on Processes - Co-operating Processes - Inter-process Communication.

UNIT II   18 Hours

CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - **Process Synchronization**: The Critical Section Problem - Semaphores - Classical Problems of Synchronization - Critical Regions.

UNIT III   18 Hours

Deadlocks: System Model - Deadlock characterization – Methods for Handling Deadlocks Deadlock Prevention - Deadlock avoidance- Deadlock Detection - Recovery from Deadlock.

UNIT IV   18 Hours

Storage management: Memory management - Swapping – Contiguous Memory allocation. Paging – Segmentation – Segmentation with Paging –**Virtual memory:** Demand paging - Page replacement – Thrashing. Mass-**Storage Structure**: Disk Structure- Disk scheduling.

UNIT V   18 Hours

File-System Interface: File Concept-File Attributes-File Operations – **Access Methods**: Sequential Access – Direct Access –**Directory Structure**: Single-Level Directory- Two –Level Directory-Tree-Structured Directories-Introducing Shell Programming – Linux General Purpose Commands-Process Oriented Commands – Communication Oriented Commands.

Text Books				
S.No	Author	Title of the Book	Publisher	Year of Publications
1.	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Operating System Concepts	Wiley Student Edition	9th edition 2012
2.	B.Mohamed Ibrahim,	Linux Practical Approach	Firewall Media	2005
Reference Books				
1.	Milan Milenkovic	Python Programming A Modern Approach	McGraw Hill	2003
2.	Andrew S. Tanenbaum,	Operating System Concepts and Design - Modern Operating Systems	Prentice Hall of India.	2nd Edition 2001
3.	Deital and Deital	Introduction to Operating System‖, Pearson Education	APress	1990

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong   M-Medium

SEMESTER – V

Core Practical – V	B.Sc. Information technology	Credits : 4
Course code: M23UITP05	PRACTICAL -V- PYTHON PROGRAMMING	Contact Hours per week : 5

Objectives
- To able to design and program Python applications.
- To able to create loops and decision statements in Python.
- To able to work with functions and pass arguments in Python.
- To able to build and package Python modules for reusability.
- To able to read and write files in Python.

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

CO Number	CO Statement	Knowledge level
CO1	Demonstrate the understanding of syntax and semantics of PYTHON language	
CO2	Identify the problem and solve using PYTHON programming techniques.	
CO3	Identify suitable programming constructs for problem solving.	K3 & K4
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	
CO5	Develop a PYTHON program for a given problem and test for its correctness.	

List of Practical's:
1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.

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SEMESTER – V

DISCIPLINE SPECIFIC ELECTIVE - I	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE1	NATURAL LANGUAGE PROCESSING	Contact Hours per week :6

Objectives

- To understand approaches to syntax and semantics in NLP.
- To learn natural language processing and to learn how to apply basic algorithms in this field.
- To understand approaches to discourse, generation, dialogue and summarization within NLP.
- To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics etc..
- To understand current methods for statistical approaches to machine translation.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recite the fundamental concepts and techniques of natural language processing.	K1
CO2	Use NLP technologies to explore and gain a broad understanding of text data.	K3
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.	K3
CO4	Analyze large volume text data generated from a range of real-world applications.	K4
CO5	Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness.	K2

UNIT I   18 Hours

Introduction : Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue- Applications – The role of machine learning – Probability Basics –Information theory – Collocations -N-gram Language Models – Estimating parameters and smoothing – Evaluating

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language models.

UNIT II 18 Hours

Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. **Syntactic Analysis**: Context-free Grammar-Constituency- Parsing- Probabilistic Parsing.

UNIT III 18 Hours

Semantic analysis and Discourse Processing: Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. **Discourse Processing:** cohesion-Reference Resolution-Discourse Coherence and Structure.

UNIT IV 18 Hours

Natural Language Generation: Architecture of NLG Systems-Generation Tasks and Representations- Application of NLG. **Machine Translation**: Problems in Machine Translation. Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.

UNIT V 18 Hours

Information retrieval and lexical resources: **Information Retrieval**: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation. **Lexical Resources**: WorldNet-Frame Net Stemmers- POS Tagger- Research Corpora SSAS.

Text Books				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	Daniel Jurafsky, James H. Martin	Speech & language processing	Pearson publications	2010
2.	Allen, James.	Natural language understanding	Pearson	1995
Reference Book				
1.	Pierre M. Nugues	An Introduction to Language Processing with Perl and Prolog	Springer	2009

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - I	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE2	Artificial Neural Networks	Contact Hours per week : 5

Objectives

- To understand the Error Correction and various learning algorithms and tasks.
- To identify the various Single Layer Perception Learning Algorithm.
- To identify the various Multi-Layer Perception Network..
- To analyze the Deep Learning of various Neural network and its Applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basics of artificial neural networks with single layer and multi-layer perception networks.	K1
CO2	Apply Error Correction and various learning algorithms and tasks	K3
CO3	Present Perception Learning Algorithm.	K4
CO4	Understand the various Multi-Layer Perception Network.	K2
CO5	Select Deep Learning of various Neural network and its Applications.	K2

UNIT I   15 Hours

Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non Linear Separable Problem - Multilayer Networks. Learning Algorithms Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem

UNIT II   15 Hours

Introduction: Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit 12

assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.

UNIT III   **15 Hours**

      Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.

UNIT IV   **15 Hours**

      Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm.

UNIT V   **15 Hours**

      Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzman Machines, Training of DNN and Applications.

Text Books

S.No	Author	Title of the Book	Publisher	Year of Publications
1.	Satish Kumar	Neural Networks A Classroom Approach	McGraw Hill	Second Edition
2.	Simon Haykins	Neural Network- A Comprehensive Foundation	Pearson Prentice Hall	2nd Edition, 1999

Reference Book

1.	B. Yegnanarayana,	Artificial Neural Networks	PHI, New Delhi	1998

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

SEMESTER – V

DISCIPLINE SPECIFIC ELECTIVE - I	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE3	CRYPTOGRAPHY	Contact Hours per week : 4

Objectives

- To understand the fundamentals of Cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	K4
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	K3
CO3	Apply the different cryptographic operations of public key cryptography	K2
CO4	Illustrate the various Authentication schemes to simulate different applications.	K3
CO5	Understand various Security practices and System security standards.	K1

UNIT I   12 Hours

Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.

UNIT II   12 Hours

Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Mono alphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography.

UNIT III   12 Hours

Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.

UNIT IV   **12 Hours**

Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. **Web Security:** Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction**.**

UNIT V   **12 Hours**

Intruders – Malicious – software – Firewalls.

Text Book				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	William Stallings	Cryptography and Network Security Principles andPractices	Tata McGraw-Hill	2007
Reference Books				
1.	Behrouz A. Foruzan	Cryptography and Network Security	Tata McGraw-Hill	2007
2.	AtulKahate, TMH	Cryptography and Network Security	Tata McGraw-Hill	Second Edition, 2003
3.	M.V. Arun Kumar	Network Security	USP	First Edition 2011

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - II	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE4	Human Computer Interaction	Contact Hours per week : 5

Objectives

- To learn about the foundations of Human Computer Interaction.
- To learn the design and software process technologies.
- To learn HCI models and theories.
- To learn Mobile Ecosystem.
- To learn the various types of Web Interface Design.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of HCI.	K2
CO2	Develop interactive design in HCI.	K4
CO3	Apply HCI models and theories.	K1
CO4	Relate Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	K4
CO5	Determine the various types of Web Interface Design.	K3

UNIT I   **15 Hours**

FOUNDATIONS OF HCI: The Human: I/O channels – Memory Reasoning and problem solving; The Computer: Devices –Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case tudies.

UNIT II   **15 Hours**

DESIGN & SOFTWARE PROCESS: Interactive Design: Basics – process – scenarios Navigation: screen design Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III   **15 Hours**

MODELS AND THEORIES: **HCI Models: Cognitive models**:- Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV   **15 Hours**

Mobile HCI: Mobile Ecosystem: Platforms, Application frame works **Types of Mobile Applications**: Widgets, Applications, Games Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies

UNIT V   **15 Hours**

WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies.

Text Books

S.No	Author	Title of the Book	Publisher	Year of Publications
1.	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale,	Human -Computer Interaction	Edition, Pearson Education,	2004
2.	Brian Fling	Mobile Design and Development	O - Reilly Media Inc	I Edition, 2009
3.	Bill Scott and Theresa Neil,	Designing Web Interfaces	O_Reilly	First Edition 2009

Reference Book

1.	Shneider man	Designing the User Interface: Strategies for Effective Human-Computer Interaction	Pearson Education	V Edition

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - II	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE5	**ARTIFICIAL INTELLIGENCE**	Contact Hours per week : 5

Objectives

- To learn various concepts of AI Techniques
- To learn various Search Algorithm in AI.
- To learn probabilistic reasoning and models in AI.
- To learn about Markov Decision Process.
- To learn various type of Reinforcement learning.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the various concepts of AI Techniques	K2
CO2	Apply various Search Algorithm in AI.	K3
CO3	Evaluate probabilistic reasoning and models in AI.	K1
CO4	Build Markov Decision Process.	K2
CO5	Categorize various type of Reinforcement learning Techniques.	K4

UNITI   **15 Hours**

Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

UNIT II   **15 Hours**

Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search A* algorithm, Game Search

UNIT III   **15 Hours**

Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT IV   **15 Hours**

Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT V   **15 Hours**

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference

learning, active reinforcement learning- Q learning.

Text Books				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach	Prentice Hall	3rd Edition
2.	Elaine Rich and Kevin Knight	Artificial Intelligence	Tata McGraw Hill	2010
Reference Books				
1.	Trivedi, M.C	Classical Approach to Artifical Intelligence	Khanna Publishing House	2009
2.	Saroj Kaushik	Artificial Intelligence	Cengage Learning India	2011
3.	David Poole and Alan Mack worth	Artificial Intelligence: Foundations for Computational Agents	Cambridge University Press	2010

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

SEMESTER – V

DISCIPLINE SPECIFIC ELECTIVE - II	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE6	ANALYTICS FOR SERVICE INDUSTRY	Contact Hours per week : 6

Objectives

- To recognize challenges in dealing with data sets in service industry.
- To identify and apply appropriate algorithms for analyzing the healthcare, human resource, hospitality and tourism data.
- To make choices for a model for new machine learning tasks..
- To identify employees with high attrition risk.
- To prioritizing various talent management initiatives for your organization.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and critically apply the concepts and methods of business analytics.	K2
CO2	Identify, model and solve decision problems in different settings.	K1
CO3	Label appropriate courses of action for a given managerial situation whether a problem or an opportunity.	K1
CO4	Create viable solutions to decision making problems.	K4
CO5	Determine a sense of ethical decision-making and a commitment to the long-run welfare of both organizations and the communities they serve.	K3

UNIT I   **18 Hours**

    Healthcare Analytics : Introduction to Healthcare Data Analytics-Electronic Health Records– Components of EHR- Coding Systems- Benefits of EHR- Barrier to Adopting HER Challenges-Phenotyping Algorithms. Biomedical Image Analysis and Signal Analysis- Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models.

UNIT II   **18 Hours**

    Healthcare Analytics Applications : Applications and Practical Systems for Healthcare– Data Analytics for Pervasive Health- Fraud Detection in Health care Data Analytics for Pharmaceutical Discoveries- Clinical Decision Support Systems Computer- Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data.

UNIT III 18 Hours

HR Analytics: Evolution of HR Analytics, HR information systems and data sources, HR Metric and HR Analytics, Evolution of HR Analytics; HR Metrics and HR Analytics; Intuition versus analytical thinking; HRMS/HRIS and data sources; Analytics frameworks like LAMP, HCM:21(r) Model.

UNIT IV 18 Hours

Performance Analysis: Predicting employee performance, Training requirements, evaluating training and development, Optimizing selection and promotion decisions..

UNIT V 18 Hours

Tourism and Hospitality Analytics: Guest Analytics – Loyalty Analytics – Customer Satisfaction – Dynamic Pricing – optimized disruption management – Fraud detection in payments.

Text Books				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	Chandan K. Reddy and Charu C Aggarwal,	Healthcare data analytics	Taylor & Francis	2015
2.	Edwards Martin R, Edwards Kirsten	Predictive HR Analytics: Mastering the HR Metric	Kogan Page Publishers ISBN-0749473924	2016
3.	Fitz-enzJac (2010	The new HR analytics: predicting the economic value of your company's human capital investments	AMACOM, ISBN-13: 978-0-8144-1643-3	2010
Reference Books				
1.	Hui Yang and Eva K. Lee	Healthcare Analytics: From Data to Knowledge to Healt	Wiley	2016
2.	Fitz-enzJac, Mattox II John	Predictive Analytics for Human Resources	Wiley, ISBN1118940709	2014

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

Core Course - VII	B.Sc. Information Technology	Credits : 4
Course code: M23UIT07	DATA COMMUNICATION AND NETWORKING	Contact Hours per week : 6

Objectives

- ➢ To provide students with an overview of the concepts and fundamentals of data communication and computer networks.
- ➢ To familiarize the student with the basic taxonomy and terminology of the computer.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental concepts of computer networks and its application areas	K2
CO2	Identify and use various networking techniques and components to establish networking connection and transmission.	K3
CO3	Analyze the services performed by different network layers and recent advancements in networking.	K4
CO4	Compare various networking models, layers, protocols and technologies.	K2
CO5	Select the appropriate networking mechanisms to build a reliable network.	K1

UNIT I   18 Hours

Introduction: Data Communication-Networks: Distributed Processing Network Criteria Physical Structures –Network Models-Categories of Network-Internetwork - The Internet Protocols and Standards – **Network Models**: Layers in the OSI Model - TCP/IP Protocol Suite.

UNIT II   18 Hours

Data and Signals: Analog and Digital Data - Analog and Digital Signals – Performance - Digital Transmission: Transmission Modes – Multiplexing: FDM – WDM - Synchronous TDM -Statistical TDM - Transmission Media: Guided media - Unguided Media.

UNIT III   18 Hours

Switching: Circuit Switched Networks - Datagram Networks-Virtual Circuit Network - **Error Detection and Correction:** Introduction - Block Coding - Linear Block Codes - Cyclic Codes: Cyclic Redundancy Check - Checksum. Data Link Control: Framing - Flow Control and Error Control - Noiseless Channel: Stop-and-wait Protocol..

UNIT IV   **18 Hours**
   Wired LANs: Standard Ethernet-GIGABIT Ethernet-**Wireless LAN:** Bluetooth Connecting LANs: Connecting Devices: Passive HubsRepeaters-Active Hubs-Bridges-Two Layer Switches-Routers-Three layer Switches-Gateway-Network Layer: **Internet Protocol**: IPv4 – Ipv6-Transition from IPv4 to IPv6.

UNIT V   **18Hours**
   Network Layer: Delivery, Forwarding and Routing- Unicast Routing Protocols: Distance Vector Routing-Link state routing- **Future & Current Trends in Computer Networks: 5G Network: Salient** FeaturesTechnology-Applications-Advanced Features-Advantages & Disadvantages-Internet of Things: key Features -Advantages & Disadvantages-IOT Hardware- IOT Technology and Protocols-IOT Common Uses-Applications-WiFi-WiMax Lifi-Lifi vs Wifi.

Text Books				
S.No	Author	Title of the book	Publisher	Year of publication
1.	Behrouz and Forouzan	Data Communication and Networking	TMH	4th Edition 2006
2.	Ajit Pal	Data Communication and Computer Networks	PHI	2014
Reference Book				
1.	Jean Walrand	Communication Networks	Tata McGraw Hill	2nd Edition 1998

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

T-

Core Course - VIII	B.Sc. Information Technology	Credits : 4
Course code: M23UIT08	DATA MINING	Contact Hours per week : 6

Objectives

➢ To identify the underlying concepts and the fundamental data mining methodologies with the ability to formulate and solve problem.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the fundamentals and the principles of Data Mining	K1
CO2	Apply suitable different pre-processing for data mining	K2
CO3	Classify data-mining techniques based on the different applications.	K4
CO4	Analyze the various data mining algorithms with respect to functionality.	K4
CO5	Design appropriate data models for data mining techniques to solve real world problems.	K3

UNIT I   **18 Hours**

Introduction: Data Mining – Kinds of Data and Patterns to be Mined – Technologies used –Kinds of Applications are Targeted - Major Issues – Data objects and Attribute types – Basic statistical Descriptions of **Data Pre-processing** : Data Cleaning – Data Integration - Data Reduction - Data Transformation.

UNIT II   **18 Hours**

Association Rules Mining: Introduction – Frequent Itemset Mining Methods: Apriori Algorithm-Generating Association Rules from Frequent Itemsets-Improving the efficiency of Apriori-A Pattern –Growth Approach for mining Frequent Itemsets-Pattern Evaluation Methods.

UNIT III   **18 Hours**

Classification: Introduction –Basic concepts – Logistic regression - Decision tree induction–Bayesian classification, Rule–based classification-Model Evaluation and selection.

UNIT IV   **18 Hours**

Cluster Analysis: Introduction-Requirements for Cluster Analysis - **Partitioning Methods**: The K-Means method - **Hierarchical Method**: Agglomerative method - **Density based methods**: DBSCAN-**Evaluation of Clustering**: Determining the Number of Clusters – Measuring Clustering

Quality.

UNIT V   **18 Hours**

Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods - **Data Visualization**: Pixel-oriented visualization – Geometric Projection visualization technique Icon-based-Hierarchical visualization-Visualizing complex data and relations.

Text Book				
S.No	Author	Title of the book	Publisher	Year of publication
1.	Jiawei Han, Micheline Kamber, Jian Pei	Data Mining concepts and techniques	Elsevier publication	3rd Edition
Reference Books				
1.	Ian H. Witten and Eibe Frank Morgan Kaufmann.	Data Mining: Practical Machine Learning Tools and Techniques	Tata McGraw Hill Publication	2nd Edition 2005
2.	Arun K Pujari.	Data Mining Techniques	University Press,	2008
3.	Daniel T. Larose Chantal D. Larose	Data mining and Predictive analytics	Wiley Publication	Second Ed 2015
4.	G.K. Gupta	Introduction to Data mining with case studies	PHI, Private limited, New Delhi	2nd Edition 2011

Mapping with Programme Specific Outcomes

Co's /PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
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

Core Practical - VI	B.Sc. Information Technology	Credits : 4
Course code: M23UITP06	DATA MINING LAB	Contact Hours per week :5

Objectives

To understand the data sets, data pre-processing and demonstrate the working of algorithms for data mining tasks such as association rule mining, classification, clustering and regression.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the fundamentals and the principles of Data Mining	
CO2	Apply suitable different pre-processing for data mining	
CO3	Classify data-mining techniques based on the different applications.	**K3 & K4**
CO4	Analyze the various data mining algorithms with respect to functionality.	
CO5	Design appropriate data models for data mining techniques to solve real world problems.	

List of Program's

1. Understanding the data
2. Visualization Techniques
3. Data Pre-processing
4. Handling Missing Values
5. Data Reduction-Principal Component Analysis
6. Data Normalization-Min-Max, Z-score, Decimal Scaling
7. Association Rule Mining-Apriori Algorithm
8. Classification
9. Logistic Regression
10. Decision Tree
11. Naive Bayesian
12. Clustering
13. K-Means Clustering
14. DBSCAN
15. Agglomerative
16. Case Study

DISCIPLINE SPECIFIC ELECTIVE - III	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE7	FUZZY LOGIC	Contact Hours per week : 4

Objectives

- To understand the basic concept of Fuzzy logic.
- To learn the various operations on relation properties.
- To study about the membership functions.
- To learn about the Defuzzification and Fuzzy Rule-Based System.
- To learn the concepts of Applications of Fuzzy Logic.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics of Fuzzy sets, operation and properties	K2
CO2	Apply Cartesian product and composition on Fuzzy relations and use the tolerance and Equivalence relations.	K3
CO3	Analyze various fuzzification methods and features of membership Functions.	K4
CO4	Evaluate defuzzification methods for real time applications.	K2
CO5	Design an application using Fuzzy logic and its Relations.	K1

UNIT I   12 Hours

Introduction to Fuzzy Logic- Fuzzy Sets- Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and **Fuzzy Relations**: Introduction-Cartesian Product of Relation-Classical Relations-Cardinality of Crisp Relation.

UNIT II   12 Hours

Operations on Crisp Relation-Properties of Crisp Relations-Composition Fuzzy Relations, Cardinality of Fuzzy Relations-Operations on Fuzzy Relations Properties of Fuzzy Relations-Fuzzy Cartesian Product and Composition-Tolerance and Equivalence Relations ,Crisp Relation.

UNIT III   12 Hours

Membership Functions: Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Intuition, Inference, Rank Ordering.

UNIT IV   12 Hours

Defuzzification: Introduction, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule-Based System: Introduction, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules.

UNIT V   **12 Hours**

     Applications of Fuzzy Logic: Fuzzy Logic in Automotive Applications, Fuzzy Antilock Brake System-Antilock-Braking System and Vehicle SpeedEstimation Using Fuzzy Logic.

Text Book

S.No	Author	Title of the Book	Publisher	Year of Publications
1.	S. N. Sivanandam, S. Sumathi and S. N. Deepa.	Introduction to Fuzzy Logic using MATLAB	Springer-Verlag Berlin Heidelberg	2007

Reference Books

1.	Guanrong Chen and Trung Tat Pham	Introduction to Fuzzy Sets, Fuzzy Logic and Fuzzy Control Systems	-	2009
2.	Timothy J Ross	Fuzzy Logic with Engineering Applications	-	2010

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - III	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE8	Big Data Analytics	Contact Hours per week :4

Objectives

- To understand the Big Data Platform and its Use cases, Map Reduce Jobs.
- To identify and understand the basics of cluster and decision tree.
- To study about the Association Rules, Recommendation System.
- To learn about the concept of stream.
- To understand the concepts of NoSQL Databases.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline with big data tools and its analysis techniques	K1
CO2	Create data by utilizing clustering and classification algorithms.	K4
CO3	Use different mining algorithms and recommendation systems for large volumes of data.	K3
CO4	Perform analytics on data streams.	K3
CO5	Build NoSQL databases and management.	K2

UNIT I   **12 Hours**

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — 12 The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model.

UNIT II   **12 Hours**

Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- **Classification:** Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier.

UNIT III   **12 Hours**

Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity — **Recommendation System:** Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV   **12 Hours**

Introduction to Streams Concepts: — Stream Data Model and Architecture — Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V   **12 Hours**

NoSQL Databases: Schema-less Models: Increasing Flexibility for Data Manipulation-Key Value Stores12 Document Stores — Tabular Stores — Object Data Stores — Graph Databases Hive — Sharding —Hbase — Analyzing big data with twitter — Big data for ECommerce Big data for blogs — Review of Basic Data Analytic Methods using R.

Text Book				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	AnandRajaraman and Jeffrey David Ullman	Mining of Massive Datasets	Cambridge University Press	2012
Reference Books				
1.	David Loshin	Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph	Morgan Kaufmann/El sevier Publishers	2013
2.	EMC Education Services	Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data	Wiley publishers	2015

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

SEMESTER – VI

DISCIPLINE SPECIFIC ELECTIVE - III	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE9	COMPUTATIONAL INTELLIGENCE	Contact Hours per week : 6

Objectives

- To identify and understand the basics of AI and its search..
- To study about the Fuzzy logic systems.
- To understand and apply the concepts of Neural Network and its functions.
- To understand the concepts of Artificial Neural Network
- To study about the Genetic Algorithm.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the fundamentals of artificial intelligence concepts and searching techniques.	K2
CO2	Develop the fuzzy logic sets and membership function and defuzzification techniques.	K1
CO3	Understand the concepts of Neural Network and analyze and apply the learning techniques.	K2
CO4	Paraphrase the artificial neural networks and its applications.	K3
CO5	Illustrate the concept of Genetic Algorithm and Analyze the optimization problems using GAs.	K4

UNIT I   18 Hours

Introduction to AI: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.

UNIT II   18 Hours

Fuzzy Logic Systems: Notion of fuzziness – Operations on fuzzy sets – Tnorms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.

UNIT III   18 Hours

Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Back propagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications

UNIT IV   18 Hours

Artificial Neural Networks: Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network**.**

UNIT V   18 Hours

Genetic Algorithm: Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm.

Text Books				
S.No	Author	Title of the Book	Publisher	Year of Publications
1.	S.N. Sivanandam and S.N. Deepa,	Principles of Soft Computing	Wiley India Pvt	2nd Edition
2.	Stuart Russell and Peter Norvig,	Artificial Intelligence - A Modern Approach	Pearson Education in Asia	2nd Edition,

Reference Books				
1.	F. Martin, Mcneill, and Ellen Thro, 2000. Chin Teng Lin, C. S. George Lee	Fuzzy Logic: A Practical approach AP Professional	PHI	2010
2.	Chin Teng Lin, C. S. George Lee	Neuro-Fuzzy Systems	PHI	2015

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - IV	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE10	GRID COMPUTING	Contact Hours per week : 4

Objectives

- To learn the basic construction and application of Grid computing.
- To learn grid computing organization and their Role.
- To learn Grid Computing Anatomy.
- To learn Grid Computing road map.
- To learn various type of Grid Architecture.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic elements and concepts of Grid computing	K2
CO2	Identify the Grid computing tool kits and Framework.	K1
CO3	Outline the concepts of Anatomy of Grid Computing..	K4
CO4	Choose the concept of service oriented architecture	K2
CO5	Modify the knowledge on grid and web service architecture.	K3

UNIT I   12 Hours

Introduction: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.

UNIT II   12 Hours

Grid Computing organization and their Roles: Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), #Organization Developing Grid Computing Toolkits and Framework#, Organization and building and using grid based solutions to solve computing, commercial organization building and Grid Based solutions.

UNIT III   12 Hours

Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, # Grid Architecture # and relationship to other

distributed technology.

UNIT IV   **12 Hours**

The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, #Semantic Grids#.

UNIT V   **12 Hours**

Merging the Grid services Architecture with the Web Services Architecture: Service-Oriented Architecture, Web Service Architecture, #XML messages and Enveloping#, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.

Text Book				
S.No	Author	Title of the Book	Publisher	Year of Publications
1.	Joshy Joseph and Craig Fellenstein,	Grid computing	Pearson / IBM Press,	2004
Reference Book				
1.	Charles River	Ahmer Abbas and Graig computing, A Practical Guide to technology and applications	Media,	2003

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - IV	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE11	TRENDS IN COMPUTING	Contact Hours per week : 4

Objectives

- To learn current trends in various computer science and information technology fields.
- To learn various fields of Cloud computing, Green computing, the Edge and Fog computing technology.
- To learn about Architecture and Application design of Cloud, Edge & fog computing.
- To improve security services of computing technologies.
- To learn the various Case Studies in Cloud, Edge & fog Computing.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the concepts, applications, benefits and limitations of various computing paradigms.	K1
CO2	Classify the computing technologies based on its architecture and infrastructure and identify its strategies.	K4
CO3	Apply various cloud services, Security threat exposure within a cloud computing infrastructure.	K3
CO4	Perform the problems and solutions involved in various stages of different computing environments.	K4
CO5	Discuss the importance of cloud, edge and Fog technology and implement innovative ideas and practices for regulating green IT	K2

UNIT I   **12 Hours**

     Era of Cloud Computing: Introduction – Components of Cloud Computing – Cloud Types: Private, Public and Hybrid clouds – Limitations of the Cloud - Virtualization: Structure and Mechanisms**.**

UNIT II   **12 Hours**

     Cloud computing Services: Software as a Service (SaaS) – Platform as a Service(PaaS)- Infrastructure as a Service(IaaS)-Database as a Service

(DBaaS)- Recent Trends in cloud computing and Standards-Data Security in Cloud – Risks and Challenges with Cloud Data- Security as a Service.

UNIT III   12 Hours
Edge Computing: Edge Computing and Its Essentials: IntroductionEdge Computing Architecture- Advantages and Limitations of Edge Computing Systems- Edge Computing Interfaces and Devices - Edge Analytics: Edge Data Analytics – Potential of Edge Analytics – Architecture of Edge Analytics – Case study.

UNIT IV   12 Hours
Edge Data storage Security: Edge-Based Attack Detection and Prevention-Edge Computing Use Cases and Case Studies: Edge Computing High- Potential Use Cases. Introduction to green computing–Calculating carbon footprintChoosing Green PC path: A green make over – Buying green computer- Choosing Earth Friendly peripherals

UNIT V   12 Hours
Fog Computing: Introduction to Fog computing – Architecture - Characteristics - Fog Computing Services – Fog Resource Estimation and Its Challenges-Fog computing on 5G networks – Fog computing Use cases and Case studies.

Text Books				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	Kailas Jayaswal,Jagannath Kallakurchi,Donald J.Houde,Dr.Devan Shah	Cloud Computing – Black Book	Universities Press (India) Pvt. Ltd	Edition :2020 (UNIT I & II : CHAPTER 1,2,3,9,11)
2.	K. Anitha Kumari G. Sudha Sadasivam D. Dharani M. Niranjanamurthy,	Fundamentals, Advances and Applications EDGE COMPUTING	CRC Press	First Edition 2022, (UNIT III & IV : CHAPTER 1, 2 , 3, 4,5,6)
3.	Woody Leonhard and Katherine Murray,	Green Home Computing for Dummies	Willey Publishing Inc	2009 (UNIT IV : CHAPTER 2 ,5,6,7)
4.	Evangelos Markakis, George Mastorakis, Constandinos	Cloud and Fog computing in 5G mobile Networks	X.Mavromoutakis and Evangelos pallis	First edition 2017. (UNIT V: CHAPTER 2)
Reference Books				
1.	RajKumar Buyya, ChristianVecchiola, S.ThamaraiSelvi	Mastering Cloud Computing	McGraw Hill Education	2013

2.	Michael Miller	Cloud Computing	Pearson Education	2009
3.	Shijun Liu Bedir Tekinerdogan Mikio Aoyama Liang-Jie Zhang	Edge Computing	EDGE	2018
4.	FlavioBonomi, Rodolfo Milito, Jiang Zhu, SateeshAddepalli	Fog Computing and Its Role in the Internet of Things	Helsinki, Finland. Copyright	August 17 2012
5.	Amir M. Rahmani · Pasi Liljeberg Jürgo-Sören Preden	Fog Computing in the Internet of Things	Springer	2018 . (UNIT V: PART/CHAPTER (1.4,2.5)

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium

DISCIPLINE SPECIFIC ELECTIVE - IV	B.Sc. Information Technology	Credits : 3
Course code: M23UITDSE12	IOT and its Applications	Contact Hours per week : 4

Objectives

- To use of Devices, Gateways and Data Management in IoT.
- To design IoT applications in different domain and be able to analyze their performance.
- To implement basic IoT applications on embedded platform.
- To gain knowledge on Industry Internet of Things.
- To learn about the privacy and Security issues in IoT.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Give Example of big data tools and its analysis techniques	K2
CO2	Analyze data by utilizing clustering and classification algorithms.	K4
CO3	Apply different mining algorithms and recommendation systems for large volumes of data.	K3
CO4	Perform analytics on data streams.	K3
CO5	Choose NoSQL databases and management	K1

UNIT I   12 Hours

IoT& Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT II   12 Hours

M2M to IoT – A Basic 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 12 Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT III   12 Hours

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 IV   12 Hours

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management.

UNIT V   12 Hours

Internet of Things Privacy: Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smart Approach. Data Aggregation for the IoT in Smart Cities, Security.

Text Book				
S.No	**Author**	**Title of the Book**	**Publisher**	**Year of Publications**
1.	Vijay Madisetti and ArshdeepBahga, ― Universities Press (INDIA) Private Limited 2014,	Internet of Things: (A Hands-on Approach)	Universities Press (India) Pvt. Ltd	2014 1st Edition.
Reference Books				
1.	Michael Miller	The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World	kindle version	2010
2.	Francis daCosta,	Internet of Things: A Scalable Approach to Connecting Everything	Apress Publications	1st Edition 2013
3.	Waltenegus Dargie, Christian Poellabauer	Fundamentals of Wireless Sensor Networks: Theory and Practice	Tata McGraw Hill	2013
4.	CunoPfister	Getting Started with the Internet of Things	O"Reilly Media	2011

Mapping with Programme Specific Outcomes:

CO's/ PSO's	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	M	S	S	S

S-Strong M-Medium