VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
Elayampalayam, Tiruchengode, Namakkal (DT), Tamil Nadu 637 205

M.Sc., (INFORMATION TECHNOLOGY)
(Candidates admitted from 2018-2019 onwards)

REGULATIONS

I. SCOPE OF THE PROGRAMME

Master of Science in Information Technology (M.Sc IT) can be considered to be one of the most prominent Master's level programs in our country. This program mainly deals with the development of computer applications for the purpose of updating computer programming languages. M.Sc. (IT) also aims at creating strong knowledge of theoretical Information Technology subjects who can be employed in research and development units of industries. The course has a time period of 2 years with 4 semesters.

II. SALIENT FEATURES

- Regular conduct of guest lectures and seminars
- Campus recruitment
- Provides facilities such as Internet Access and In-House Library
- Provides Career Guidance for Higher studies.
- Conduct of Personality Development Program
- Visiting Faculties from Industries

III. OBJECTIVES OF THE COURSE

The course objective of the M.Sc. Information Technology program is to provide advanced and in-depth knowledge of Information Technology and its applications to enable students pursue a professional career in Information and Communication Technology in related industry, business and research. The course designed to impact professional knowledge and practical skills to the students.

IV. ELIGIBILITY FOR ADMISSION

A Candidate who has passed B.Sc. Computer Science / BCA/ B.SC. Computer Technology / B.Sc. Information Science / B.Sc. Information Technology / B.Sc. Software Engineering Degree of Periyar university or any of the Degree of any other university accepted by the syndicate as equivalent thereto subject to such conditions as may be prescribed therefore shall be permitted to appear and qualified for the M.Sc. Information Technology Degree

Examinations of Vivekanandha College of Arts and Sciences for Women after a course of study of two academic years.

V.DURATION OF THE PROGRAMME

- The course shall extend over a period of two academic years consisting of four semesters. Each academic year will be divided into two semesters. The First semester will consist of the period from July to November and the Second semester from December to April.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women with the approval of Periyar University.

VI. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously and the Internal Assessment Marks will be as under:

1.	Average of Three Tests (Description)	- 10 Marks
2.	Case Study (Write ups, Discussions, PPT)	- 10 Marks
3.	Attendance	- 05 Marks
	Total	= 25 Marks

Internal Assessment Marks for Practical

1.	Attendance	- 05 Marks
2.	Observation	- 10 Marks
3.	Test	- 20 Marks
4.	Newspaper (Relevant to IT)	- 05 Marks
	Total	= 40 Marks

PASSING MINIMUM (Theory)

EXTERNAL

In the End Semester Examinations, the passing minimum shall be 50 % out of 75 Marks. (38 Marks)

PASSING MINIMUM (Practical)

EXTERNAL

In the End Semester Examinations, the passing minimum shall be 50 % out of 60 Marks. (30 Marks)

Distribution of Marks

Program writing	: 10 Marks
Debugging	: 10 Marks
For Correct Results	: 05 Marks

Viva-voce : 05 Marks

The Passing minimum shall be 50% out of 60 marks (30 Marks per Question)

VII. ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the End semester Examination only on earning 75 % of attendance and only when her conduct has been satisfactory. It shall be opened to grant exemption to a candidate for valid reasons subject to conditions prescribed.

PERCENTAGE	MARKS	
	THEORY	PRACTICAL
< 74	0	0
75-80	1	2
81-85	2	4
86-90	3	6
91-95	4	8
96-100	5	10

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the examination of Core Courses (main and allied subjects) and securing marks

a) 75 % and above shall be declared to have passed the examination in first class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
b) 60% and above but below 75 % shall be declared to have passed the examinations in first class without Distinction.
c) 50%and above but below 60% shall be declared to have passed the examinations in second class.
d) Candidates who pass all the examinations prescribed for the course at the first appearance itself and within a period of two consecutive academic years from the year of admission only will be eligible for award of rank.

IX. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the degree only if she has undergone the above degree for a period of not less than two academic years comprising of four semesters and passed the examinations prescribed and fulfilled such conditions have been prescribed therefore.

X. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the semester examination in the concerned subject in subsequent semesters and shall pass the examination.

XI. COMMENCEMENT OF THE REGULATIONS

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

Candidates who were admitted to the PG course of study before 2019-2020 shall be permitted to appear for the examinations under those regulations for a period of two years i.e., up to and inclusive of the examination of 2020-2021. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

EVALUATION OF EXTERNAL EXAMINATIONS (EE)

QUESTION PAPER PATTERN – Theory

Time duration: 3 Hours Max. Marks: 75

PART- A: 20 x 1= 20

Answer all the questions

All are Multiple Choice Questions

(Four questions from each unit)

PART- B: 5 x 5= 25

Answer all the questions

One Question from each unit (either or type)

PART- C: 3 x 10 = 30

Answer any three questions

One Question from each unit

The Passing minimum shall be 50% out of 75 marks (38 marks)

QUESTION PAPER PATTERN – Practical

Time duration: 3 Hours Max. Marks: 60

1. One compulsory question from the given list of objectives : 30 Marks
2. One either/OR type question from the given list of objectives : 30 Marks

The Passing minimum shall be 50% out of 60 marks (30 marks)

EVALUATION PATTERN – Mini & Major Project (Internal)

Review I : 10 Marks
Review II : 10 Marks
Review III : 20 Marks

EVALUATION PATTERN – Mini & Major Project (External)

Evaluation (External) : 40 Marks
Viva-voce (Internal, External) : 20 Marks

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
Elayampalayam, Tiruchengode, Namakkal (DT), Tamil Nadu 637 205

VISION OF THE COLLEGE

- To evolve into a centre of Excellence in higher education through creative and innovative practices to secure social equity for women.

MISSION OF THE COLLEGE

- To provide sufficient learning infrastructure to the students to pursue their studies.
- To provide good opportunity for higher education and conducive environment to students to acquire education.
- To provide quality academic programs, training activities and Research Facilities.
- To facilitate Industry-Institute interaction.

PG RESEARCH DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

VISION OF THE DEPARTMENT

- To provide high academic goals to the students and make them the world leaders both in educational and research through effective teaching.

MISSION OF THE DEPARTMENT

- To create, share and apply knowledge in Computer Applications including inter disciplinary areas that extends the scope of Computer Science and benefit humanity.
- To educate students to be successful, ethical and effective problem solvers.
- To prepare the students to contribute positively to the economic well being of our region and nation.

M.Sc. INFORMATION TECHNOLOGY
PROGRAM OBJECTIVES

PO1: The M.Sc. Information Technology program is to provide advanced and in depth knowledge of IT enabled services used in the Computer fields and its applications to enable students pursue a professional career in information and communication technology in related industry, business and research.

PO2: The course designed to impact professional knowledge and practical skills to the students.

P03: Information Technology post graduate will have a strong understanding of the field of information technology including analysis techniques scientific principle and design methodologies to be the successfully employed, pursue a post graduate degree, or continue their professional educational

PROGRAM SPECIFIC OUTCOMES

After completion of the programme the graduates will be able to

PSO1: To understand the fundamental concepts of computer system, including hardware and networking.

PSO2: To Design, and analyze precise specifications of algorithms, procedures, and interaction behavior.

PSO3: Ability to communicate effectively in both verbal and written form in industry and society.

PSO4: Apply the technologies in various fields of Information technology, including Mobile applications, Web site development and management, databases, and computer networks.

DURATION OF THE PROGRAMME

- The course shall extend over a period of two academic years consisting of **four semesters.** Each **academic year** will be divided into **two semesters**. The **First semester** will consist of the **period from July to November** and the **Second semester from December to April.**
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Computer Applications, Vivekanandha College of Arts and Sciences for Women(Autonomous) with the approval of Periyar University.

MAPPING OF PO'S AND PSO'S

PSO PO	PO1	PO2	PO3
PSO1	✓		
PSO2	✓		✓
PSO3		✓	✓
PSO4		✓	✓

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
[AUTONOMOUS]
ELAYAMPALAYAM, TIRUCHENGODE -637205.
DEPARTMENT OF COMPUTER APPLICATIONS
M.Sc. – INFORMATION TECHNOLOGY

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER CBCS-OBE PATTERN
(For the Candidates admitted from the year 2018-2019 Onwards)

Sem	Course Code	Courses	Credits	Hours	Marks		
					I.A. Marks	E.E. Marks	Total Marks
I	18P1ITC01	Core Course-I - Object Oriented Analysis and Design	4	4	25	75	100
	18P1ITC02	Core Course-II - Advanced Computer Architecture	4	4	25	75	100
	18P1ITC03	Core Course-III - Design and Analysis of Algorithms	4	4	25	75	100
	18P1ITC04	Core Course-IV- PHP Programming	4	4	25	75	100
	18P1ITE__	Elective Course- I	4	4	25	75	100
	18P1ITP01	Core Course-V- PHP Programming Lab	2	4	40	60	100
	18P1ITP02	Core Course – VI – Algorithms Lab	2	4	40	60	100
	-	Library / Net Lab	-	1	-	-	-
	-	Student Personality Development	-	1	-	-	-
	TOTAL		**24**	**30**	**205**	**495**	**700**
II	18P2ITC05	Core Course-VII – Multimedia Technology	4	4	25	75	100
	18P2ITC06	Core Course-VIII - Software Project Management and Quality Assurance	4	4	25	75	100
	18P2ITC07	Core Course-IX – Network Security and Cryptography	4	5	25	75	100
	18P2ITC08	Core Course-X – Mobile Computing	4	4	25	75	100
	18P2ITE__	Elective Course -II	4	4	25	75	100
	18P2ITP03	Core Course-XI - Multimedia Technology Lab	2	4	40	60	100
	18P2ITPR01	Core Course-XII – Mini Project	2	3	40	60	100
	-	Library / Net Lab	-	1	-	-	-
	-	Student Personality Development	-	1	-	-	-
	TOTAL		**24**	**30**	**205**	**495**	**700**

III	18P3ITC09	Core Course-XIII – Data Mining and Warehousng	4	4	25	75	100
	18P3ITC10	Core Course-XIV – Python Programming	4	4	25	75	100
	18P3ITC11	Core Course-XV – Advanced Database Management Systems	4	4	25	75	100
	18P3ITE__	Elective Course- III	4	4	25	75	100
		EDC- I	2	4	25	75	100
	18P3ITP04	Core Course-XVI- Python Programming Lab	2	4	40	60	100
	18P3ITP05	Core Course-XVII – Data Mining Lab using R-Tool	2	4	40	60	100
		Human Rights	1	-	25	75	100
	-	Library / Net Lab	-	1	-	-	-
	-	Student Personality Development	-	1	-	-	-
	TOTAL		**23**	**30**	**230**	**570**	**800**
IV	18P4ITC12	Core Course-XVIII –Ad hoc and Sensor Networks	4	4	25	75	100
	18P4ITC13	Core Course-XIX – Digital Image Processing	4	5	25	75	100
	18P4ITE__	Elective Course -IV	4	4	25	75	100
	18P4ITP06	Core Course –XX- Digital Image Processing Using MATLAB	2	4	40	60	100
	18P4ITPR02	Core Course-XXI - Dissertation and Viva-Voce (In-house Project)	6	-	40	60	100
	-	Library / Net Lab	-	1	-	-	-
	-	Student Personality Development	-	1	-	-	-
	TOTAL		**22**	**19**	**155**	**345**	**500**
	Total No. of Credits (Core + EDC+Elective)		**72+2+1 +16= 91**	**109**	**795**	**1905**	**2700**

EDC-EXTRA DISIPLINARY COURSE

Students are expected to opt EDC (Non major elective) offered by other departments.

I.A. – INTERNAL ASSESSMENT

E.E. – END SEMESTER EXAMINATIONS

The content of the syllabus and regulations may be followed for first and second semesters as per the regulations passed in the academic year 2018-2019.

ELECTIVE COURSES

Elective-I

Course Code	Course Name
18P1ITE01	Distributed Computing
18P1ITE02	Soft Computing
18P1ITE03	Cloud Computing
19P1ITE04	Client/Server Technology

Elective-II

Course Code	Course Name
18P2ITE05	Grid Computing
18P2ITE06	Real Time Embedded Systems
18P2ITE07	Information Retrieval
19P2ITE08	Artificial Intelligence

Elective-III

Course Code	Course Name
18P3ITE09	Green Computing
18P3ITE10	Advanced Operating Systems
18P3ITE11	Ubiquitous Computing
18P3ITE12	Compiler Design

Elective-IV

Course Code	Course Name
18P4ITE13	Enterprise Resource Planning
18P4ITE14	Neural Networks
18P4ITE15	Big Data Analytics
18P4ITE16	Theory of Computation

Subject Title	Object Oriented Analysis and Design	Semester	I
Subject Code	18P1ITC01	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

Understand the importance and basic concepts and of object oriented modeling,

- Specify, analyze and design the use case driven requirements for a particular system.
- Model the event driven state of object and transform them into implementation specific layouts.
- Identify, analyze the subsystems, various components and collaborate them interchangeably.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the basic and advanced level of architecture and the evaluation and performance of computer system.	K1
CO2	To Analyse the performance of cache memory, internal and external memory.	K2
CO3	To Identify the characteristics and functions of computer arithmetic and addressing modes.	K3
CO4	To Recognize the processor organization.	K4
CO5	To Associate with parallel processing.	K4

Subject Title	Object Oriented Analysis and Design	Semester	I
Subject Code	18P1ITC01	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	An overview of object oriented systems development – Object Basics - object oriented systems development life cycle.	K1	12
II	Object Oriented Methodologies: Introduction - Rumbaugh Object Modeling Technique – The Booch Methodology – The Jacobson Methodologies – Patterns – Frameworks – The Unified Approach.	K2	12
III	Unified Modeling Language: Introduction – static and dynamic models – why modeling? – UML diagrams – UML class diagram – use-case diagram – UML dynamic modeling – UML extensibility.	K3	12
IV	Object Analysis: Classification – Introduction – Classification Theory – Approaches for Identifying Classes – Noun Phrase Approach – Common Class Patterns Approach – Use Case Driven Approach – Classes, Responsibilities And Collaborators – Naming Classes.	K4	12
V	Object Oriented Design Process and Design Axioms: Introduction – The Object Oriented Design Process – Object oriented design axioms – corollaries – design patterns - Designing Classes: UML object constraints language – class visibility: designing well defined public, private and protected protocols –designing classes: refining attributes.	K4	12

Learning Resources	
Text Books	1. Ali Bahrami, "Object Oriented Systems Devlopment", McGRAW – Hill international editions, computer science series.
Reference Books	1. Grady Booch, Robert A. Maksimchuk, Michael W. Engel, and Bobbi J. Young, "Object-Oriented Analysis and Design with Applications", 3rd Edition 2. Simon Bennett, Steve McRobb, and Ray Farmer," Object-oriented Systems Analysis and Design Using UML".
Web Sites/Links	1. www.uml-diagrams.org 2. www.utdallas.edu

Content beyond the syllabus:

1. Understand about analysis model and design model
2. Practice the OOAD using a real case study

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓	✓	✓
CO3	✓		✓	✓
CO4	✓		✓	✓
CO5	✓		✓	✓

Subject Title	Advanced Computer Architecture	Semester	I
Subject Code	18P1ITC02	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

This subject is to provide the students to gain a deep insight on computer architecture.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the basic and advanced level of architecture and the evaluation and performance of computer system.	K1
CO2	To Analyse the performance of cache memory, internal and external memory.	K2
CO3	To Identify the characteristics and functions of computer arithmetic and addressing modes.	K3
CO4	To Recognize the processor organization.	K4
CO5	To Associate with parallel processing.	K4

Subject Title	Advanced Computer Architecture	Semester	I
Subject Code	18P1ITC02	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction: Structure and Function-Computer Evaluation and Performance: History of computers- Designing for Performance: Microprocessor speed-performance balance-Improvement in chip organization and architecture. Computer Function and Interconnection: Computer Components-Computer Function: Instruction Fetch and Execute- I/O Function. Interconnection structure-Bus interconnection: Bus structure-Multiple bus hierarchies.	K1	12
II	Cache Memory: Characteristics of Memory Systems-Memory hierarchy-Cache memory principles- Elements of cache design: Cache size-Mapping function-replacement algorithms-write policy-line size-Number of caches. Internal Memory: Semi-conductor main memory: Organization-DRAM & SRAM-types of ROM External Memory: Magnetic Design: read and write mechanism-Data organization and Formatting.	K2	12
III	Computer Arithmetic: ALU-Integer Representation: Sign magnitude representation-Twos complement Representation-Fixed point Representation. Integer Arithmetic: Negation-Addition & Subtraction-Multiplication-Division. Principles of Floating point Representation. Instruction Sets: Characteristics & Functions: Machine Instruction characteristics-Types of Operands-Types of Operations. Instruction Sets: Addressing Modes and Formats: Addressing: Immediate- Direct- Indirect- Register- Register Indirect- Displacement addressing- Stack addressing.	K3	12
IV	Processor structure & Function: Processor Organization- Register organization- Instruction cycle-instruction pipelining-The Pentium Processor. Micro Operations: The fetch cycle- The Indirect Cycle- The Interrupt cycle- The Execute Cycle- The instruction Cycle. Control of the Processor: Functional Requirements-Control Signals-A control signals example- Internal Processor Organization-The Intel 8085.	K4	12
V	Parallel Processing: Multiple Processor Organizations: Types of parallel processor Systems- Parallel Organizations. Symmetric Multiprocessors: Organization-Multiprocessor Operating System Design considerations-A mainframe SMP. Cache Coherence and the MESI Protocol: Software Solutions-Hardware Solutions-Snoopy Protocols-The MESI Protocol-Read Miss-Read Hit-Write Miss-Write Hit-Cache Consistency.	K4	12

Learning Resources	
Text Books	1. Computer Organization & Architecture-Designing for Performance by William Stallings, Ninth Edition, 2012, PEARSON Prentice Hall Publication.
Reference Books	1. Computer Systems Organizations & Architecture by John D. Carpinelli, First Edition, 2007, PEARSON Prentice Hall Publication. 2. Computer System Architecture by M. Morris Mano, Third Edition, 2006, PEARSON Prentice Hall Publication. 3. Computer Architecture: Concepts and Evaluation by Gerrit A. Blaauw, First Edition, 2008, PEARSON Prentice Hall Publication. 4. Computer System Architecture and Parallel Processing by Kai Hwang, Faye A. Briggs, 2009, McGraw-Hill Publications.
Web Sites/Links	1. www.techopedia.com 2. www.cis.upenn.edu

Content beyond the syllabus:

1. Significance of Chip multiprocessor
2. Approaches to vector Computation
3. Hardwired Implementation

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			✓
CO2	✓	✓		✓
CO3			✓	
CO4	✓		✓	✓
CO5	✓		✓	

Subject Title	Design and Analysis of Algorithms	Semester	I
Subject Code	18P1ITC03	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To identify issues related to the definition, creation and usage of classes, objects and methods.
- To discuss the principles of inheritance and polymorphism and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces.
- To provide the foundation of good programming skills by discussing key issues to the design of object-oriented software, including programming design patterns.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Analyze the pros and cons of applying the different design paradigms in different Contexts	K1
CO2	Exposure to randomization as a tool for developing algorithms.	K2
CO3	Relevance of analysis to the design of efficient computer algorithms	K3
CO4	Identify the computational issues and apply suitable algorithms to solve it effectively	K4
CO5	Conceptualize and design efficient and effective algorithmic solutions for different realworld problems.	K4

Subject Title	Design and Analysis of Algorithms	Semester	I
Subject Code	18P1ITC03	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations - and Mathematical Analysis of Recursive and Non-Recursive Algorithms.	K1	12
II	Divide and conquer methodology – Merge Sort – Quick Sort – Binary search – Binary Tree Traversal – Multiplication of large integers- Strassen's matrix multiplication Greedy method – Prim's algorithm – Kruskal's algorithm – Dijkstra's Algorithm.	K2	12
III	Transform and Conquer – Presorting - Balanced Search Tree – AVL Tree - Heaps and Heap Sort - Dynamic Programming - Computing a binomial coefficient – Warshall's and Floyd's algorithm.	K3	12
IV	Optimal binary - search tree – Knapsack problem – Backtracking – N-Queens problem – Hamiltonian circuit problem – subset sum problem.	K4	12
V	Branch and bound: Assignment problem – Knapsack problem – Traveling salesman problem. – Approximation algorithms for NP-hard NP Complete Problems.	K4	12

Learning Resources	
Text Books	1. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2006.(Unit -I: chapter 1,2 Unit -II : chapter 4,9 Unit III: chapter 6,8 Unit -IV: chapter 8,11 Unit -V: chapter 11)
Reference Books	1. T.H.Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Pvt. Ltd., 2001. 2. Sara Baase and Allen Van Gelder, "Computer Algorithms – Introduction to Design and Analysis", Pearson Education Asia, 2003. 3. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, 2003.
Web Sites/Links	1. www.cs.cornell.edu 2. www.cs.duke.edu

Content beyond the syllabus:

1. Concepts of Big O notation.
2. Importance of innovative designs.
3. Knowledge about visual interfaces.

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓		✓
CO3			✓	✓
CO4	✓			✓
CO5	✓		✓	✓

Subject Title	PHP Programming	Semester	I
Subject Code	18P1ITC04	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To learn about, PHP and MySQL are the emerging open source technology to construct web application. PHP provided with huge set of standard library and function which aids us to build and deploy application in repaid fashion. Delegate students a good practical knowledge of how to write successful HTML/PHP code utilizing a MySQL database.

COURSE OUTCOMES

CO Number	CO Statement	Knowledge Level
CO1	Identify and achieve the concept of PHP programming.	K1
CO2	Illustrate the usage of control functions, branching statements in PHP	K2
CO3	Recognize the concepts of Arrays in PHP programming.	K3
CO4	Practice the concepts of Arrays and String functions.	K4
CO5	Illustrate the concepts of passing arguments to functions & recognize the basic concepts of OOPs.	K4

Subject Title	PHP Programming	Semester	I
Subject Code	18P1ITC04	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction – Server Side Scripting – PHP Basics: Syntax And Variables – Comments – Simple Types – Output.	K1	12
II	PHP Control Structures and functions – Branching – Looping – Functions – Functions and variable scope – User Defined Functions – Function Scope.	K2	12
III	PHP Arrays – Creating Arrays – Retrieving Values – Multidimensional Arrays – Inspecting Arrays – Deleting from Arrays – Iteration.	K3	12
IV	String Handling – Strings in PHP – String Functions – Number Handling – Numerical Types – Mathematical Operators – Simple Mathematical Functions – Randomness – Regular Expression in PHP.	K4	12
V	Passing information with PHP – GET Arguments – POST Arguments – Formatting form variables - Web Forms: SQL forms – Basic Form Submission – Editing Data with an HTML form – Basic PHP constructs for OOP.	K4	12

Learning Resources	
Text Books	1. Steve Suehring, Tim Cinverse, and Joyce Park, "PHP6 and MySQL - Bible", Wiley India Edition, 2012.
Reference Books	1. Steven Holzner, "**PHP: The Complete Reference", McGraw-Hill Education**, 2007. 2. Mario Lurig, "PHP Reference: Beginner to Intermediate PHP5", 2008.
Web Sites/Links	1. www. howtostartprogramming.com 2. www.cloudways.com 3. www.w3schools.com

Content beyond the syllabus:

1. Knowing about the applications of OO PHP
2. Understanding about Advantages and disadvantages of PHP
3. Scope of PHP.

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓		✓
CO3			✓	✓
CO4	✓			✓
CO5	✓		✓	✓

Subject Title	PHP Programming Lab	Semester	I
Subject Code	18P1ITP01	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 2

COURSE OBJECTIVE

- PHP and MySQL are the emerging open source technology to construct web application.
- PHP provided with huge set of standard library and function which aids us to build and deploy application in repaid fashion.
- Delegate students a good practical knowledge of how to write successful HTML/PHP code utilizing a MySQL database

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Acquaint themselves with the fundamental concepts and programming environment of PHP.	K1
CO2	Illustrate the usage of control functions, branching statements in PHP	K2
CO3	Implement object oriented concepts like inheritance, reusability, and encapsulation	K3
CO4	Apply custom exceptions and employ concurrency.	K4
CO5	Understand and Design the Database using MySQL.	K4

Subject Title	PHP Programming Lab	Semester	I
Subject Code	18P1ITP01	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 2

Objective:

To learn PHP programming language to improve their software skill with real time data.

Experiments

1. Write a program to create login information.
2. Write a program to create student information.
3. Write a program to create medical information.
4. Write a program for resume preparation.
5. Write a program to create email ID.

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓		✓
CO3			✓	✓
CO4	✓			✓
CO5	✓		✓	✓

Subject Title	Algorithms Lab	Semester	I
Subject Code	18P1ITP02	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 2

COURSE OBJECTIVE

- Teach the student the fundamental algorithms
- Teach the student how to analyze the performance of algorithms
- Teach the student the fundamental algorithmic design strategies

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Know the big O, omega, and theta notations and their usage to give asymptotic upper, lower, and tight bounds on time and space complexity of algorithms.	K1
CO2	Know how to determine the worst time complexity of algorithms	K2
CO3	Know how to deduce the recurrence relations that describe the time complexity of recursively-defined algorithms, and solve recurrence relations using mathematical induction and the recursion-tree method	K3
CO4	Know how analyze the average-case running times of randomized algorithms, and recite algorithms that employ randomization.	K4
CO5	Know how to design algorithms using the divide-and-conquer strategy, and recite algorithms that employ this strategy.	K4

Subject Title	Algorithms Lab	Semester	I
Subject Code	18P1ITP02	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 2

Objective:

To learn algorithms to improve their implementation skills for developing softwares

Experiments

1. Apply the Divide and Conquer technique to arrange a set of numbers using Merge Sort method
2. Perform Strassen's matrix multiplication using Divide and Conquer method
3. Solve the Knapsack problem using Dynamic Programming
4. Construct a Minimum Spanning Tree using Greedy method
5. Perform Warshall's Algorithm using Dynamic Programming
6. Solve Dijkstra's Algorithm using Greedy Technique
7. Solve Subset Sum problem using Backtracking
8. Implement the 8-Queens Problem using Backtracking
9. Implement Knapsack Problem using Backtracking
10. Find the solution of Traveling Salesperson Problem using Branch and Bound technique

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓		✓
CO3			✓	✓
CO4	✓			✓
CO5	✓		✓	✓

ELECTIVES

Subject Title	Distributed Computing	Semester	I
Subject Code	18P1ITE01	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- The structure of distributed systems using multiple levels of software is emphasized.

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate knowledge of the basic elements and concepts related to distributed system technologies;	K1
CO2	demonstrate knowledge of the core architectural aspects of distributed systems	K2
CO3	Design and implement distributed applications	K3
CO4	Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems)	K4
CO5	Use and apply important methods in distributed systems to support scalability and fault tolerance	K4

Subject Title	**Distributed Computing**	**Semester**	**I**
Subject Code	**18P1ITE01**	**Specialization**	**NA**
Type / Hours	**Elective Course / 60 Hours**	**L:T:P:C**	**4 : 0 : 0 : 4**

Unit	**Syllabus Contents**	**Levels**	**Number of**

			Sessions
I	Introduction: Definition Of distributed system- goals - Types of Distributed Systems Architectures: Architectural Styles - System Architectures - Architectures Vs Middleware – Self-Management in Distributed Systems. Processes: Threads – Virtualization - Clients Servers - Code Migration.	K1	**12**
II	Communication: Fundamentals - Remote Procedure Call – Message-Oriented Communication – Stream-Oriented Communications - Multicast Communication. Naming: Names, Identifiers and Addresses - Flat Naming - Structured Naming – Attribute-Based Naming.	K2	**12**
III	Synchronization: Clock Synchronization - Logical Clocks - Mutual Exclusion -Global Positioning of Nodes - Election Algorithms. Consistency and Replication: Introduction – Data-Centric Consistency Models – Client-Centric Consistency Models-Replica Management - Consistency Protocols.	K3	**12**
IV	Fault Tolerance: Introduction to Fault Tolerance - Process Resilience - Reliable Client-Server Communication - Reliable Group Communication - Distributed Commit- Recovery. Security: Introduction to Security - Secure Channels - Access Control -Security Management.	K4	**12**
V	Distributed Object-Based Systems: Architecture – Processes – Communication –Naming – Synchronization - Consistency and Replication – Fault Tolerance -Security. Distributed file system: Architecture–Processes-communication-Naming Synchronization-Consistency and Replication - Fault Tolerance – Security – Distributed Web-Based Systems.	K4	**12**

Learning Resources	
Text Books	1. Andrew S.Tanenbaum, Maarten Van Steen, "Distributed Systems" Principles and Paradigms. Second Edition, PHI Publications, New Delhi -2008.
Reference Books	1. Birman, Kenneth P, "Reliable Distributed Systems - Technologies, Web Services, and Applications" , Springer Publications, 2005 Edition, 2. G.coulouris, Jean Dollimore & Tim Kindberg,Distributed Systems: Concepts and Design (4th Edition) , Addison Wesley Publications, 2005 Edition.
Web Sites/Links	1. www.dezyre.com 2. www.techtarget.com

Content beyond the syllabus:

1. Distributed computing Vs. parallel computing
2. Distributed computing Vs. Cloud computing
3. Distributed computing Vs. distributed databases

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1			✓	✓
CO2		✓		
CO3	✓		✓	✓
CO4	✓			
CO5	✓		✓	✓

Subject Title	Soft Computing	Semester	I
Subject Code	18P1ITE02	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- This course aims at introducing the fundamental theory and concepts of computational intelligence methods, in particular neural networks, fuzzy systems, genetic algorithms and their applications in the area of machine intelligence.

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	To familiarize with soft computing concepts.	K1
CO2	To Basics of ANN and Learning Algorithms	K2
CO3	Introduce the fuzzy logic concepts, fuzzy principles and relations.	K3
CO4	Ann as function approximation.	K4
CO5	Genetic Algorithm and its applications to soft computing.	K4

Subject Title	Soft Computing	Semester	I
Subject Code	18P1ITE02	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Soft Computing: Introduction of Soft Computing-Soft Computing vs. Hard Computing-various types of Soft Computing techniques-Applications of Soft Computing.	K1	12
II	Back propagation Networks: Architecture of Back propagation Network-Back propagation Learning –illustrations-Effect of Tuning Parameters of the Back propagation Neural Network	K2	12
III	Supervised Learning Neural Networks: Introduction - Perceptron - Adaline – Multiple Adaptive Linear Neurons – Radial Basis Function Networks. Unsupervised Learning Neural Networks: Introduction – Fixed Weight Competitive Nets – Kohonen Self Organizing Feature Maps – Learning Vector Quantization – Adaptive Resonance Theory Network.	K3	12
IV	Fuzzy logic: Fuzzy Set Theory: Fuzzy versus Crisp - Fuzzy Sets: Membership Function-Basic Fuzzy set operations-Properties-Fuzzy Relations: Fuzzy Cartesian Product-Operations. Fuzzy Systems: Fuzzy Logic-Fuzzy Rule based system-Defuzzification Methods-Applications.	K4,K2	12
V	Genetic Algorithm: Introduction – Biological Background – Genetic Algorithm and Search Space – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple Genetic Algorithm – General Genetic Algorithm – Operators – Stopping Condition in Genetic Algorithm Flow – Constraints in Genetic Algorithm – Advantages and Limitations of Genetic Algorithm- Applications of Genetic Algorithm.	K4	12

Learning Resources	
Text Books	1. Rajasekaran. S and VijayalakshmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, New Delhi-2011 (fifteenth edition) (Unit I,II,IV) 2. Sivanandam. S. N and Deepa S. N, Principles of Soft Computing, 2 ND Edition Wiley India, 2012.(Unit III & V)
Reference Books	1. Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009. 2. Sudarshan K. Valluru and T.Nageswara Rao, Introduction to Neural Network and Genetic Algorithm Theory and Applications,Pashupathi Printers Ltd,New Delhi, 2010. 3. KwangH.Lee, First Course on Fuzzy Theory and Applications,Springer International Edition,2009. 4. AmirthavalliM,Fuzzy Logic and Neural Network,Scitech Publications Pvt.Ltd,2007
Web Sites/Links	1. www.banasthali.org 2. www.soft-computing.de/def.html

Content beyond the syllabus:

1. Applications using ANN
2. Scope of Soft Computing Techniques
3. Study about "R' Tools

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2		✓		
CO3	✓		✓	✓
CO4		✓		✓
CO5	✓		✓	✓

Subject Title	Cloud Computing	Semester	I
Subject Code	18P1ITE03	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVES

Students will try to learn:

- Basics of cloud computing.
- Key concepts of virtualization.
- Different Cloud Computing services

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Define Cloud Computing and memorize the different Cloud service and deployment models	K1
CO2	Describe importance of virtualization along with their technologies	K2
CO3	Use and Examine different cloud computing services	K3
CO4	Understand the concepts of SOA	K2
CO4	Analyse the offerings of cloud	K3

Subject Title	Cloud Computing	Semester	I
Subject Code	18P1ITE03	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction-Essentials-Benefits-Why Cloud?-Cloud and Virtualization-Cloud Services requirements-Cloud computing characteristics-Cloud adoption-Cloud Rudiments. Cloud Deployment Models: Introduction-Cloud characteristics-Measured service-Cloud deployment models-Security in a public cloud-public vs private clouds.	K1	12
II	Cloud as a Service: Introduction-Gamut of cloud solutions-Principal Technologies-cloud strategy-Cloud design and implementation using SOA-Conceptual cloud model. Cloud solutions: Introduction-Cloud Ecosystem-Cloud business process management-cloud service management-computing on Demand-Cloud sourcing.	K2	12
III	Cloud Offerings: Introduction-Information storage, Retrieval, Archive and Protection-Cloud analytics-Testing under cloud-Information security-Virtual desktop infrastructure-Storage cloud. Cloud management: Introduction-Resiliency-provisioning-Asset management-cloud governance-Charging models, usage reporting ,billing and metering.	K3	12
IV	Cloud Virtualization Technology: Introduction-Virtualization Defined-Benefits-Server Virtualization- Virtualization for X86 Architecture-Hypervisor Management service-Virtual Infrastructure requirements. Cloud infrastructure: Deep drive-Introduction-Storage Virtualization-Storage area network-Network attached storage-Client Server Virtualization.	K2	12
V	Cloud and SOA: Introduction-SOA journey to infrastructure-SOA and Cloud-SOA defined-SOA and IAAS-SOA-Based cloud Infrastructure steps. Cloud Mobility: Introduction-The business problem-Mobile enterprise application platforms-Mobile application architecture overview.	K3	12

Learning Resources	
Text Books	1. "Cloud Computing" 2nd edition, Dr.Kumarsaurabh,wiley India. 2. Cloud Computing web – based applications at change the way you work & Collaborate online", Michael miller,pearson. 3. "Cryptography and Network Security" principles and practices – William Stallings. 5th Edition."Cloud Computing a practical approach", McGraw Hills.
Reference Books	1. "Cloud Computing a practical approach", McGraw Hills. 2. Cloud Computing Implementation , Management, & Security "John W. Rittinghouse, James F. Ransome "Special Indian Edition.
Web Sites/Links	1. www.safecomputing.umich.edu 2. www.cloud-council.org 3. https://cloudsecurityalliance.org

Content beyond the syllabus:

1. Data storage security in cloud computing.
2. RSA data security in cloud computing.

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2		✓		
CO3	✓		✓	✓
CO4		✓		
CO5	✓		✓	✓

Subject Title	Client/Server Technology	Semester	I
Subject Code	19P1ITE04	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVES

- Understand fundamental concepts of Web Services including: Client Server systems, system models of distributed systems, networks that distributed systems run on, communication protocols between processes in distributed systems

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Identify the components of Client/server architecture	K1
CO2	Analyse the Os and database of Client	K2
CO3	Identify the server environment	K3
CO4	Apply the concepts in CGI	K2
CO5	Know the interaction between client & server systems	K3

Subject Title	Client/Server Technology	Semester	I
Subject Code	19P1ITE04	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction to Client Server Computing-Benefits of Client Server Computing-Hardware Trends-Components of Client Server Applications-Categories of Client Server Applications-Dispelling the Myths-Obstacles-Upfront and Hidden-Open Systems and Standards-Setting Organization-Factors for Success.	K1	12
II	Client Hardware and Software-Client Components-Client Operating System-GUI-X Window Vs Windowing-Database Access-Application Logic-Client Server Products-Requirements-GUI Design Standards-Open GUI Standards.	K2	12
III	Server Hardware-Benchmarks-Categories of Server-Features of Server Machines-Classes of Server Machines-Server Environment-Eight layers of Software-Network Management Environment-Network Computing Environment-Server Requirements-Platform Independence-Transaction Processing-Connectivity-Intelligent Database-Stored Procedures-Triggers-Load Leveling-Optimizer-Testing and Diagnostic Tools-Reliability-Backup and Recovery Mechanisms- Server Data Managements and Access Tools.	K3	12
IV	Overview of Networking-Layers, Interfaces and protocols-Standard Architectures-Network Characteristics-Network Management Standards-LAN Hardware and Software-LAN Hardware-Network Operating System.	K2	12
V	Development and Deployment-Development Methodology-Convert Existing Screen Interfaces-Application Development Tools-Managing the Production Environment-Production Requirements-Future Trends.	K3	12

Learning Resources	
Text Books	1. Dawna Travis Dewire, "Client/Server computing, 11th Reprint 2009, Tata McGraw Hill. (Unit–I:Chapter 1,2,3&4, Unit-II: Chapter 5,6&7,Unit-III :Chapter 8,9,10,11&12) Unit – IV:Chapter 15 &16, Unit –V:Chapter 17,18 &19)
Reference Books	1. Jafferey D. Schank, "Novell's guide to Client/Server Application and Architecture", 2005 Edition, BPB Publications. 2. Robert Orfali, Dan Harkey and Jeri Edwards, "Client/Server Survival Guide", 3rd Edition, 2009 John Wiley & Sons, Inc.
Web Sites/Links	1. www.opengroup.org/comsource/techref2/NCH1222X.HTM 2. www.springer.com/productFlyer

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2		✓		
CO3	✓		✓	✓
CO4		✓	✓	
CO5	✓	✓		✓

II SEMESTER

Subject Title	Multimedia Technology	Semester	II
Subject Code	18P2ITC05	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To formulate a working definition of interactive multimedia and to demonstrate the use of animation, digitized sound, video control, media entertainment
- To develop conceptual maps of content and process for interactive multimedia instructional programs

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Gain experience with multimedia processes using current	K1
CO2	Demonstrate an advanced knowledge of image manipulation	K2
CO3	Aware of the rapid rate of change of technology and methodologies in the multimedia environment.	K3
CO4	Demonstrate proper knowledge of recording	K4

Subject Title	Multimedia Technology	Semester	II
Subject Code	18P2ITC05	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction –Multimedia – Media and Data Streams : Medium – Main properties of a multimedia system – multimedia – Traditional data streams characteristics – Data stream characteristics for continuous media –information units	K1	12
II	Sound/Audio: Basic Sound Concepts – Music – Speech, Images and Graphics: Basic Concepts – Computer Image Processing.	K2	12
III	Video and animation: Basic concepts – television – computer based animation. Data Compression: Basic compression techniques - JPEG – MPEG – DVI.	K3	12
IV	Multimedia Communication System: Application Subsystem – Transport subsystem, User Interfaces.	K4	12
V	Multimedia Application: Introduction –Media Composition – Media Integration – Media Communication – Media Entertainment.	K4	12

Learning Resources

Text Books	1. Ralf Steinmetz & Klara Nahrstedt – " Multimedia Computing , Communication & Applications " Pearson Education.
Reference Books	1. Fred T,Hofstetter – " Multimedia Literacy " – 3rd edition TMH. 2. Simoin j.,Gibbs, Dionysios C and Tsichriziz " Multimedia Programming" , Addison Wesley, 1994 3. John F.Koegel Buford, " Mutimedia Systems", Addison Wesley, 1994
Web Sites/Links	1. www.cs.cf.ac.uk 2. www.techterms.com

Content beyond the syllabus

1. How to consume the media?
2. Knowing H.261 format
3. Knowledge about optical storage media

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		✓
CO2		✓	✓	
CO3				✓
CO4	✓		✓	✓

Subject Title	**Software Project Management and Quality Assurance**	**Semester**	**II**
Subject Code	**18P2ITC06**	**Specialization**	**NA**
Type / Hours	**Core Course / 60 Hours**	**L:T:P:C**	**4 : 0 : 0 : 4**

COURSE OBJECTIVE

- To understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
- Be familiar with the different methods and techniques used for project management

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the various models of software life cycle.	K1
CO2	Prepare students to undertake large software projects	K2
CO3	Introduce the students to the high-level strategies required for managing projects from their genesis to completion	K3
CO4	Apply the techniques learned to improve the quality of their own software development	K4

Subject Title	Software Project Management and Quality Assurance	Semester	II
Subject Code	18P2ITC06	Specialization	NA
Type / Hours	Core Course	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction – Product Life – Project life cycle models - water fall model – Prototyping model – RAD model – Spiral Model – Process Models – Metrics.	K1	12
II	Software Configuration Management – Definitions and terminology – processes and activities – Configuration Audit – Metrics – Software Quality Assurance – Definitions – Quality Control and Assurance – SQA Tools – Organization of Structures – Risk Management – Risk Identification, Monitoring.	K2	12
III	Project initiation – Project Planning and Tracking – What, Cost, When and How – Organizational Processes – Assigning Resources – Project Tracking – Project Closure – When and How.	K3	12
IV	Concepts of Quality Control, Quality Assurance, Quality Management - Total Quality Management; Cost of Quality; QC tools - 7 QC Tools and Modern Tools; Other related topics - Business Process Re-engineering –Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.	K4	12
V	Software Engineering Principles, Software Project Management, Software Process, Project and Product Metrics, Risk Management, Software Quality Assurance; Statistical Quality Assurance - Software Reliability, Muse Model; Software Configuration Management; Software Testing; CASE (Computer Aided Software Engineering).	K4	12

Learning Resources

Text Books	1. Gopalaswamy Ramesh, "Managing Globle Software Projects" Tata McGraw Hill Publishing Company Ltd, New Delhi, 2002. 2. Pressman, Roger, "Software Engineering ", A Practitioner's approach, 7th edition, Tata Mc-Graw Hill, 2006. 6th Edition
Reference Books	1. Philip B Crosby, " Quality is Free: The Art of Making Quality Certain ", Mass Market, 2004. 2. Bob Hughes and Mike Cotterell "Software Project Management", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002. 3. Watts Humphery, "Managing Software Process ", Addison - Wesley, 2000
Web Sites/Links	1. www.csi.ucd.ie 2. www.cs.ox.ac.uk 3. www.atlassian.com

Content beyond the syllabus:

1. Understanding about project tracking
2. Types and areas of contract management
3. Activities of software project management

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓

Subject Title	Network Security and Cryptography	Semester	II
Subject Code	18P2ITC07	Specialization	NA
Type	Core Course	L:T:P:C	5:0:0:4

COURSE OBJECTIVE

- Identify and explain the concepts, policies, and technologies associated with a layered and diversified defense-in-depth strategy.
- Define the concepts of auditing in a network, including the types of audits and the handling of data.

COURSE OUTCOME

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

CO	CO Statement	Knowledge

Number		Level
CO1	Classify the symmetric encryption techniques	K1
CO2	Illustrate various public key cryptography techniques	K2
CO3	Evaluate the authentication and Hash algorithms	K3
CO4	Discuss Authentication applications	K3 & K4
CO5	Apply the basic concepts of system level security	K4

Subject Title	Network Security and Cryptography	Semester	II
Subject Code	18P2ITC07	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	5 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction: Security Trends-The OSI Security Architecture – Security Attacks – Security Services- Security Mechanisms- Model for Internetwork Security – Internet Standards and the Internet Society. Symmetric Encryption and Message Confidentiality: Symmetric Encryption Principles – Symmetric Block Encryption Algorithms – Stream Ciphers.	K1	12
II	Public Key Cryptography and Message Authentication: Approaches to Message Authentication – Secure Hash Functions and HMAC – Public Key Cryptography Principles – Public Key Cryptography Algorithms – Digital Signatures – Key Management Authentication Applications: Authentication service – Public Key Infrastructures.	K2	12
III	Electronic mail Security: Pretty Good Privacy m(PGP) – S/MIME. IP Security: IP Security Overview – IP Security Architecture – Authentication Header – Encapsulating Security Payload – Combining security Associations – Key Management.	K3	12
IV	Web Security: Web Security Considerations- Security Sockets Layer (SSL) and Transport Layer Security (TLS) – Secure Electronic Transaction.	K4	12
V	Intruders: Intruders – Intrusion Detection – Password Management – Malicious Software: Viruses and Related Threats – Virus Countermeasures – Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles – Trusted Systems – Common Criteria for IT Security Evaluation.	K4	12

Learning Resources

Text Books	1. William Stallings, "Network Security Essentials – Applications and Standards", 3rd Edition, Pearson Education, 2009 Edition.
Reference Books	1. V.K.Pachghare , "Cryptography and Information Security" , PHI 2010. 2. William Stallings, "Cryptography and Network Security", Pearson Education – 2008. 3. Behrouz A Forouzan, Sophia Chung Fegan, "Data Communications and Networking", TMH-2006.
Web Sites/Links	1.www.cisco.com 2.www.interhack.net 3.www.techopedia.com

Content beyond the syllabus:

1. Knowledge about SNMP
2. Importance of Kerberos
3. Cipher Block Modes of Operations

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓
CO5			✓	✓

Subject Title	Mobile Computing	Semester	II
Subject Code	18P2ITC08	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- Understand the specifications and technologies of the Mobiles.
- Know the functionalities of various protocols and standards of mobile networks.
- Know about Mobility.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the principles of mobile computing technologies	K1
CO2	List different applications that mobile computing offers to people, employees, and businesses	K2
CO3	Describe the possible future of mobile computing technologies and applications	K3
CO4	Learn about traditional and modern network technologies and mobile computing protocols	K4

Subject Title	Mobile Computing	Semester	II
Subject Code	18P1ITC08	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction - Introduction to Telephone Systems - Mobile communication: Need for mobile communication - Requirements of mobile communication – History of mobile communication - Introduction to Cellular Mobile Communication.	K1	12
II	Mobile Communication Standards - Mobility Management: Handoff Techniques – Handoff Detection and Assignment – Types of Handoffs – Radio Link Transfer – Roaming Management - Frequency Management - Cordless Mobile Communication Systems	K2	12
III	Mobile Computing: History of data Networks - Classification of Mobile data networks - CDPD System. Satellites in Mobile Communication - Global Mobile Communication – Mobile Internet - Wireless Network Security - Wireless Local Loop Architecture - Wireless Application Protocol.	K3	12
IV	WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad Hoc Network and Bluetooth Technology - Intelligence Mobile Communication System - Fourth Generation Mobile Communication Systems.	K4	12
V	Mobile network layer: Mobile IP – Dynamic host configuration protocol – Mobile Ad-Hoc networks. Mobile transport layer: Traditional TCP – Classical TCP Improvement – TCP over 2.5/3G Wireless networks – Performance enhancing proxies – Support for Mobility: File Systems – World Wide Web.	K4	12

Learning Resources

Text Books	1. T.G. Palanivelu & R.Nakkeeran, "Wireless and Mobile Communication", PHI Learning Private Limited, 2009. 2. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition , 2009.(Unit-V : Chapters-8,9 &10)
Reference Books	1. S.William Stallings, "Wireless Communications and Networks", Pearson Education, 2002. 2. Asoke K Talukder, "http://www.amazon.com/Mobile-Computing-Applications-McGraw-Hill-Communications/dp/0071477330MobileComputing: Technology, Applications, and Service Creation", Tata McGraw-Hill Communications Engineering, 2009
Web Sites/Links	1. www.mobilecomputing.co.in 2. www.techspot.com

Content beyond the syllabus:

1. Applications using mobile computing.
2. Scope of CDPD system in mobile computing.
3. Perspective of Fourth Generation Mobile Communication Systems.

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓

Subject Title	Multimedia Technology Lab	Semester	II
Subject Code	18P2ITP03	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

COURSE OBJECTIVE

- Describe how to use text-related element in multimedia design correctly.
- To understand the multimedia technologies using software

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Knowledge of creating a compelling story	K1
CO2	Learn resize and crop images, make and work with selections, create new layers and perform other basic layer functions	K2
CO3	Familiar with techniques and resources in order to obtain knowledge and understanding of new developments in multimedia technology.	K3
CO4	Demonstrate knowledge of the legalities involved in multimedia creation and distribution.	K4

Subject Title	Multimedia Technology Lab	Semester	II
Subject Code	18P2ITP03	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

I. SOFTWARE – MACROMEDIA – DIRECTOR 6

1. Text Handling (Size Changing, Animation).
2. Play School teaching aid (Like alphabet teaching with pictures).
3. Company annual report presentation (should include any type of graph denoting the sales of the company and the other important features).
4. Department profile (should include the details about the staff and the laboratory facilities).

II. SOFTWARE – FREEHAND 8

1. Designing the college gate.
2. Text Handling (Moving, Duplicating, Scaling, Rotating, Changing the alignment and orientation).
3. Greetings card design (Like scenery, group of birds, bunch of flowers, etc…)

III. SOFTWARE – ADOBE – PREMIERE, PHOTOSHOP

1. Product Advertisement (for automobile products with the animated picture and necessary features).

V. SOFTWARE – MACROMEDIA – FLASH 8

1. Perform Motion Tuning by writing Script.
2. Generate any one game.

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		✓
CO2			✓	
CO3		✓		
CO4	✓	✓		✓

Subject Title	Mini Project	Semester	II
Subject Code	18P2ITPR01	Specialization	NA
Type	Project	L:T:P:C	2 : 0 : 0 : 2

FIRST REVIEW: **(10 Marks)**

1. Problem Identification
2. Problem definition
3. Presentation

SECOND REVIEW: **(10 Marks)**

1. Project Analysis
2. Design & Module description

FINAL REVIEW: **(20 Marks)**

1. DFD / ERD / System Flow Diagram (Whichever Applicable)
2. Coding and Implementation
3. Presentation
4. Final Project Report (with executable format including complete source code)

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

ELECTIVES

Subject Title	Grid Computing	Semester	II
Subject Code	18P2ITE05	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To understand the technology application and tool kits for grid computing.
- To understand the genesis of grid computing.
- To know the application of grid computing.
- To understand the technology and tool kits for facilitating grid computing.

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	To know the basics of Grid Computing.	K1
CO2	To know about different generations of Grid Computing.	K2
CO3	Evaluate your knowledge in Practice with the tools , the implementation of Production Grids .To know about the software infrastructure.	K1
CO4	Analyze the architecture of grid.	K3
CO5	Evaluate the services in Open Grid	K3

Subject Title	Grid Computing	Semester	II
Subject Code	18P2ITE05	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	The Grid: past, present, future: the grid – Beginnings of the grid – A community grid model – Building blocks of the grid – grid application and application middleware – futures –grids on the horizon.	K1	12
II	The evolution of the grid: Introduction – The evolution of the grid: the first generation – The evolution of the grid: the second generation - The evolution of the grid: the third generation.	K2	12
III	Software infrastructure for the I-WAY high – performance distributed computing experiment: Introduction – The I-WAY experiment – I-WAY infrastructure – Point of presence machines – Scheduler – Security – Parallel programming tools - -File systems. Implementing production grids.	K3	12
IV	Grid architecture and technologies: The anatomy of the grid – the physiology of the grid.	K4	12
V	The open grid services architecture, and data grids: Introduction - the OGSA approach – data grid services – issues – Grid Programming models: A brief survey of grid programming tools.	K4	12

Learning Resources	
Text Books	2. Fran Berman, Geoffrey C.Fox, Anthony J.G.Hey, "Grid Computing" Wiley INDIA edition, 2012.
Reference Books	1. Barry Wilkison, "Grid computing techniques and applications" CRC Press, A chapman and Hall book, 2009. 2. Ian Foster,Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure",Elsevier Series ,Second Edition, 2006. 3. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, "Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience", Wiley Press, New York, USA, 2008.
Web Sites/Links	3. www.dezyre.com 4. www.techtarget.com

Content beyond the syllabus:

4. Distributed computing Vs. parallel computing
5. Distributed computing Vs. Cloud computing
6. Distributed computing Vs. distributed databases

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓		
CO3			✓	✓
CO4	✓	✓		
CO5	✓		✓	✓

Subject Title	**Real Time Embedded Systems**	**Semester**	**II**
Subject Code	**18P2ITE06**	**Specialization**	**NA**
Type / Hours	**Elective Course / 60 Hours**	**L:T:P:C**	**4 : 0 : 0 : 4**

COURSE OBJECTIVE

- To discuss about real-time and quality of service system principles
- To discuss real-time operating systems and the resource management and quality of service issues that arise.
- To construct sample applications on representative platforms .Platforms range from handheld and Mobile computers to media and real-time server systems.

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Explain the purpose of embedded systems and compare microprocessors	K1

	with microcontrollers	
CO2	Design with microcontrollers and explain the design of a processor for specific purpose	K2
CO3	Model processes and their interactions using state machine approach	K1
CO4	Design and implement embedded software and hardware, also illustrate the working	K3
CO5	To Practice the tool.	K3

Subject Title	Real Time Embedded Systems	Semester	II
Subject Code	18P2ITE06	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction to Embedded Systems – Categories of embedded Systems – specialties of embedded systems – requirements of embedded systems – challenges and issues in embedded software development – recent trends in embedded systems – Architecture of embedded systems : Hardware architecture – software architecture – application software – communication software – Embedded systems on a Chip (SoC) and the use of VLSI designed circuits.	K1	12
II	Processor and memory organization – Devices and buses for Device Networks – Device drivers and Interrupt servicing mechanism – program modeling concepts in single and multiprocessor systems software – development process.	K2	12
III	Software Engineering Practices in the embedded software development process – Inter-process communication and synchronization of process, tasks and threads – Hardware – software co-design in an embedded system.	K3	12
IV	Hardware software co-design and program modeling – Embedded hardware design and development – embedded firmware design and development – Real-time operating system (RTOS) based embedded system design.	K4	12
V	Introduction to embedded system design with vx works and MicroC/OS-II RTOS – Integration and Testing of embedded hardware and firmware – embedded system development environment – embedded product development life cycle (EDLC).	K4	12

Learning Resources	
Text Books	1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw – Hill, Twelfth Reprint 2007. (Unit –I : Chapter 1, Unit – II: Chapter 2,3,4 & 6, Unit – III : Chapter 7,8 & 12) 2. Introduction to Embedded systems – SHIBU K V TATA McGraw-Hill 2009. (Unit – IV : Chapter – 8,9&10, Unit – V : Chapter 11, 12, 13 &15)
Reference Books	1. Embedded System Design, ARNOLD S.BERGER, South Asian Edition – 2005. 2. Embedded System Design, Frank Vahid/tony givargis – reprint – 2009.
Web Sites/Links	1. www.sciencedirect.com 2. www.embedded.com www.futureelectronics.com

Content beyond the syllabus:

1. Embedded system applications
2. Embedded system simulation tools

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓		✓	✓
CO2	✓	✓		
CO3			✓	✓
CO4	✓	✓		
CO5	✓		✓	✓

Subject Title	Information Retrieval	Semester	II
Subject Code	18P2ITE07	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- Introductory course for students by covering the organizing and analyzing information and content for the purpose of textual and non-textural information resources.
- Introduction of information retrieval systems and models, query expansion, queries, web crawling and text mining.
- Importance of information search and retrieval is interrelated with the organization and description.
- To learn about, how to use set of tools and procedures for organizing information and effective searches.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Illustrate the different query properties.	K2
CO2	Compare different search engine ranking techniques.	K2
CO3	Analyze the different retrieval metrics for retrieval evaluation.	K3
CO4	Construct a search engine.	K4
CO5	Describe different Text mining	K2

Subject Title	Information Retrieval	Semester	II
Subject Code	18P2ITE07	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number

			of Sessions
I	**INTRODUCTION** Introduction -History of IR- Components of IR – Issues –Open source Search engine Frameworks – The impact of the web on IR – The role of artificial intelligence (AI) in IR – IR Versus Web Search – Components of a Search engine- Characterizing the web.	K2	12
II	**INFORMATION RETRIEVAL** Boolean and vector-space retrieval models- Term weighting – TF-IDF weighting- cosine similarity – Preprocessing – Inverted indices – efficient processing with sparse vectors – Language Model based IR – Probabilistic IR –Latent Semantic Indexing – Relevance feedback and query expansion.	K2	12
III	**WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING** Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement – search engine optimization/spam – Web Search Architectures – crawling – meta-crawlers- Focused Crawling – web indexes –- Near-duplicate detection – Index Compression – XML retrieval.	K3	12
IV	**WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH** Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity – Hadoop & Map Reduce – Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web – Snippet generation, Summarization, Question Answering, Cross- Lingual Retrieval.	K4	12
V	**DOCUMENT TEXT MINING** Informa Mining naive Clusteri maximi;	K2	12

Learning Resources

Text Books	1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008. 2. Ricardo Baeza -Yates and Berthier Ribeiro – Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011. 3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009. 4. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010.
Reference Books	1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010. 2. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2nd Edition, Springer, 2004. 3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.
Web Sites/Links	1. https://en.wikipedia.org 2. www.sanfoundry.com 3. www.webopedia.com

Content beyond the syllabus:

1. Design Web Search Engine
2. Use Link Analysis
3. Use Hadoop and Map Reduce.

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

Subject Title	Artificial Intelligence	Semester	II
Subject Code	19P2ITE08	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To understand about the basic theory of problem solving paradigms and search strategies in artificial intelligence.
- To make the students familiar with knowledge representation, planning, learning, natural language processing and robotics.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Understand different types of AI agents	K2
CO2	Know various AI search algorithms	K2
CO3	Understand the fundamentals of knowledge representation	K3
CO4	Know how to build simple knowledge-based systems	K4
CO5	Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems	K2

Subject Title	Artificial Intelligence	Semester	II
Subject Code	19P2ITE08	Specialization	NA

Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction - Intelligent Agents- Problem Solving - by Searching - Informed Search Strategies-Optimization Problems - Adversarial Search	K2	12
II	Knowledge and Reasoning - Logical Agents - First-Order Logic - Inference in First-Order Logic - Knowledge Representation	K2	12
III	Planning – Planning and Acting in the Real World - Uncertain knowledge and reasoning - Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning Over Time - Making Simple Decisions - Making Complex Decisions	K3	12
IV	Learning - Learning from Examples - Knowledge in Learning - Statistical Learning Methods - Reinforcement Learning	K4	12
V	Communicating, Perceiving, and Acting - Natural Language Processing – Communication - Perception – Robotics.	K2	12

Learning Resources	
Text Books	Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach," Third Edition, Prentice Hall of India, New Delhi, 2010.
Reference Books	1. Elaine Rich, Kevin Knight, B. Nair, "Artificial Intelligence," Third Edition, Tata McGraw-Hill, New Delhi, 2017. 2. Eugene Charniak, Drew McDermott, 2."Introduction to Artificial Intelligence," Pearson, 2002. 3. Mick Benson, "Artificial Intelligence: Concepts and Applications," Willford Pr, 2018.
Web Sites/Links	https://ai.google

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

III SEMESTER

Subject Title	Data Mining and Warehousing	Semester	III
Subject Code	18P3ITC09	Specialization	NA
Type /Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- This module builds on the introductory module in data mining. It intends to introduce more advanced topics in databases such as data mining.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	To introduce the concept of data Mining as an important tool for enterprise data management	K2
CO2	To enable students to effectively identify sources of data and process it for data mining	K2
CO3	To make students well versed in all data mining algorithms, methods of evaluation.	K3
CO4	To impart knowledge of tools used for data mining	K4
CO5	To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding.	K4

Subject Title	Data Mining and Warehousing	Semester	III
Subject Code	18P3ITC09	Specialization	NA

Type /Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction: Data Mining – Data Mining Functionalities – Kinds of Patterns can be Mined – Classification – Data Mining Task Primitives - Major Issues. Data pre-processing: Descriptive Data Summarization - Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and concept Hierarchy Generation.	K2	**12**
II	Data warehouse and OLAP Technology: Data Warehouse – A Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From data warehouse to data mining.	K2	**12**
III	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts – Efficient and Scalable Frequent Itemset Mining Methods - Mining various kinds of Association Rules– From Association Mining to Correlation Analysis –. Constraint Based Association Mining. Classification and prediction: Issues regarding classification and prediction – Decision Tree Induction – Bayesian classification – Rule Based Classification - Classification by Back propagation – Prediction.	K3	**12**
IV	Cluster Analysis: Types of Data in Cluster Analysis - A categorization of Major Clustering Methods - Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods - Model Based Clustering Methods – Outlier Analysis - Mining Time-Series Data – Mining Sequence Patterns in Biological Data.	K4	**12**
V	Spatial Data Mining - Multimedia Data Mining – Text Mining -Mining the World Wide Web. Applications and Trends in Data Mining: Applications – Data Mining System Products and Research Prototypes – Additional Themes on Data Mining – Social Impacts of Data Mining – Trends in Data mining.	K4	**12**

Learning Resources

Text Books	1. Jiwei Han, Michelien Kamber, "Data Mining Concepts and Techniques",Morgan Kaufmann Publishers an Imprint of Elsevier, 2008. (Unit I: Chapter 1,2, Unit II: Chapter 3, Unit III: Chapter5, 6, Unit IV: Chapter 7,8 Unit V: Chapter 10,11)
Reference Books	1. Arun K.Pujari, "Data Mining Techniques", Universities Press (India) Limited, 2014. 2. Pang-NingTan,Michael Steinbach,Vipin Kumar, Introduction to Data Mining, Pearson, 2014.
Web Sites/Links	1. freevideolectures.com › Computer Science › IIT Madras 2. videolectures.net/is2011_grobelnik_warehouses/ 3. www.learnerstv.com/video/Free-video-Lecture-1636-Computer-Science 4. mydatamine.com/2011/04/top-10-data-mining-video-sites 5. www.slideshare.net/vivekjv/data-warehouse-modeling-presentation

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

Subject Title	**Python Programming**	**Semester**	**III**
Subject Code	**18P3ITC10**	**Specialization**	**NA**
Type / Hours	**Course Course / 60 Hours**	**L:T:P:C**	**4 : 0 : 0 : 4**

COURSE OBJECTIVE

- Analyze the efficiency of algorithmic problem solving Techniques.
- Acquire the mathematical foundation in analysis of algorithms
- Understand different control logic in design strategies
- Apply design principles and concepts to write source code for specific coding

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Understanding Modules and Functions in Python Programming	**K1 & K2**
CO2	Learning about Conditions and Decision Making in Python Programming	**K1 & K3**
CO3	Working with Lists, Tuples and Dictionaries in Python Programming	**K2 & K3**
CO4	Executing Files, Modules and Packages using Error Exception.	**K2 & K4**
CO5	Understanding Modules and Functions in	**K1 & K2**

	Python Programming	

Subject Title	Python Programming	Semester	III
Subject Code	18P3ITC10	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Python: Introduction – Numbers – Strings – Variables – Lists – Tuples – Dictionaries – Sets – Comparison. Code Structures: if, elif, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.	K1	12
II	Modules, Packages, and Programs: Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. Objects and Classes: Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super – In self Defense – Get and Set Attribute Values with Properties – Name Mangling for Privacy – Method Types – Duck Typing – Special Methods – Composition	K1& K2	12
III	Data Types: Text Strings – Binary Data. Storing and Retrieving Data: File Input/Output – Structured Text Files – Structured Binary Files - Relational Databases – NoSQL Data Stores.	K2 & K3	12
IV	Web: Web Clients – Web Servers – Web Services and Automation – Systems: Files – Directories – Programs and Processes – Calendars and Clocks	K4	12
V	Concurrency: Queues – Processes – Threads – Green Threads and gevent – twisted – Redis. Networks: Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – ZeroMQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and MapReduce – Working in the Clouds.	K5	12

Learning Resources	
Text Books	1. Bill Lubanovic, "Introducing Python", O Reilly, First Edition-Second Release, 2014
Reference Books	1. Mark Lutz, "Learning Python", O Reilly, Fifth Edition, 2013. David M. Beazley,"Python Essential Reference", Developer‟s Library, Fourth Edition, 2009.
Web Sites/Links	1. www.cs.cornell.edu 2. www.cs.duke.edu

Content beyond the syllabus:

Concepts of Python.

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		✓
CO2	✓		✓	
CO3		✓		✓
CO4	✓		✓	✓
CO5	✓	✓		✓

Subject Title	Advanced Database Management Systems	Semester	III
Subject Code	18P3ITC11	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- Understand the role of a database management system in an organization.
- Design and implement a small database project using Microsoft Access.
- Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Summarize the basics of advance data modeling and Advance SQL	K1
CO2	Differentiate different Database concepts and Concurrency Control.	K2
CO3	Apply various databases and data models in the different kind	K3
CO4	Analyze each and every databases and database systems	K4
CO5	Analyze different information systems and multimedia and spatial databases	K4

Subject Title	Advanced Database Management Systems	Semester	III
Subject Code	18P3ITC11	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Entity - Relationship Model:** Basic Concepts – Constraints – Keys - Design Issues - Entity-Relationship Diagram - Weak Entity Sets - Design of an E-R Database Schema. **Relational Model:** Structure of Relational Databases -Extended Relational - Algebra Operation.	K1	**12**
II	**SQL:** Background - Basic Structure - Set Operations - Aggregate Functions - null Values - Nested Sub queries - Modification of the Database - Joined Relations – Data Definition Language.	K2	**12**
III	**Object Oriented Databases:** Need For Complex Data Types - The Object Oriented Data Model - Object Oriented Languages. O**bject Relational Database:** Nested relations - Complex Type – Inheritance - Reference Type.	K3	**12**
IV	**Storage and File structure:** Overview of Physical Storage Media - Magnetic Disks – RAID - File Organization. C**oncurrency Control:** Time Stamp - Based Protocols - Validation Based Protocols - Deadlock Handling.	K4	**12**
V	**Database System Architecture:** Centralized and Client Server Architectures - Server System Architecture - Parallel System - Distributed System - Network Types. **Distributed Databases:** Homogeneous and Heterogeneous Databases - Distributed Data Storage - Distributed Transactions - Commit Protocol.	K4	**12**

Learning Resources	
Text Books	1. Henry Korth, F., Abraham Silberchatz, Sudarshan, S.,Database System Concepts, 4th Edition , Mc Graw Hill International Editions. 2. Elmasri, R., Navathe, S.B., Fundamentals of Database Systems , Addison Wesley, 2000.
Reference Books	1. Gary Hanson,W., James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999. 2. Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill,2000. 3. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series.
Web Sites/Links	1. www.studyyaar.com 2. www.itportal.in 3. www.ustudy.in

Content beyond the syllabus:

1. Normalization by standard deviation
2. Understanding about Active database management system
3. Applications of ADBMS

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

Subject Title	Python Programming Lab	Semester	III
Subject Code	18P3ITP04	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 2

COURSE OBJECTIVE

- To enable the students to gaining knowledge on Python Programming through practices

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Design programs using Iterations	**K1**
CO2	Working with Arrays for Data Structure	**K1 & K2**
CO3	Implement the Command line Argument in Python programming	**K3 & K4**
CO4	Implement the File processing in Python programming	**K4 & K5**

Subject Title	Python Programming Lab	Semester	III
Subject Code	18P3ITP04	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 2

Objective:

To understand the concepts and develop the programming skills in Python

List of Programs:

1. Programs using elementary data items, lists, dictionaries and tuples
2. Programs using conditional branches, loops.
3. Programs using functions
4. Programs using exception handling
5. Programs using classes and objects
6. Programs using inheritance
7. Programs using polymorphism
8. Programs to implement file operations.
9. Programs using modules.
10. Programs for creating dynamic and interactive web pages using forms.
11. Program using database connection.
12. Program using web services.

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1		✓	✓	
CO2	✓	✓		✓
CO3			✓	
CO4	✓			✓

Subject Title	Data Mining Lab	Semester	III
Subject Code	18P2ITP05	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

COURSE OBJECTIVE

- To make students able to write programs in R
- To learn the implementation concepts of data mining operations

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Install and use R for simple programming tasks.	K1
CO2	Extend the functionality of R by using add-on packages	K2
CO3	Extract data from files and other sources and perform various data manipulation tasks on them	K3
CO4	Apply the knowledge of R gained to data Analytics for real life applications.	K4

Subject Title	Data Mining Lab	Semester	III
Subject Code	18P2ITP06	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

Develop R Script for the following:

1. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND).
2. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames.
3. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept.
4. To perform statistical operations (Mean, Median, Mode and Standard deviation).
5. To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization
6. To perform dimensionality reduction operation using PCA.
7. To perform Simple Linear Regression and Multi Linear Regression.
8. To perform K-Means clustering operation and visualize it.
9. To diagnose any disease using KNN classification. 10. To perform market basket analysis using Apriori algorithm

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		✓
CO2			✓	
CO3		✓		
CO4	✓	✓		✓

ELECTIVES

Subject Title	Green Computing	Semester	III
Subject Code	18P3ITE09	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4: 0 : 0 : 4

COURSE OBJECTIVE

- To acquire knowledge to adopt green computing practices to minimize negative impacts on the environment, skill in energy saving practices in their use of hardware
- To examine technology tools that can reduce paper waste and carbon footprint by user, and to understand how to minimize equipment disposal requirements

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Describe awareness among stakeholders and promote green agenda and green initiatives in their working environments leading to green movement	K1
CO2	Identify IT Infrastructure Management and Green Data Centre Metrics for software development	K2
CO3	Recognize Objectives of Green Network Protocols for Data communication.	K3
CO4	Use Green IT Strategies and metrics for ICT development.	K4
CO5	To implement the concept of Green Computing	K4

Subject Title	Green Computing	Semester	III
Subject Code	18P3ITE09	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4: 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	FUNDAMENTALS 9 Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.	K1	12
II	GREEN ASSETS AND MODELING 9 Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.	K2	12
III	GRID FRAMEWORK 9 Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.	K3	12
IV	GREEN COMPLIANCE 9 Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future	K4	12
V	CASE STUDIES 9 The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.	K4	12

Learning Resources

Text Books	1. Bhuvan Unhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2011 2. Woody Leonhard, Katherrine Murray, "Green Home computing for dummies", August 2009.
Reference Books	1. Alin Gales, Michael Schaefer, Mike Ebbers, "Green Data Center: steps for the Journey", Shoff/IBM rebook, 2011. 2. John Lamb, "The Greening of IT", Pearson Education, 2009. 3. Jason Harris, "Green Computing and Green IT- Best Practices on regulations & industry", Lulu.com, 2008. 4. Carl speshocky, "Empowering Green Initiatives with IT", John Wiley & Sons, 2010. 5. Wu Chun Feng (editor), "Green computing: Large Scale energy efficiency", CRC Press, 2012.
Web Sites/Links	1. webs.wichita.edu 2. www.ukessays.com

Content beyond the syllabus:

1. Roads to green computing
2. Green computing tools

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

Subject Title	**Advanced Operating Systems**	**Semester**	**III**
Subject Code	**18P3ITE10**	**Specialization**	**NA**
Type / Hours	**Elective Course / 60 Hours**	**L:T:P:C**	**4 : 0 : 0 : 4**

COURSE OBJECTIVE

- To learn the fundamentals of Operating Systems.
- To gain knowledge on Distributed operating system concepts that includes architecture, Algorithms for Implementing DSM.

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Describe the important computer system resources and the role of operating system in their management policies and algorithms	K1
CO2	Understand the process management policies and scheduling of processes by CPU	K2
CO3	Evaluate the requirement for process synchronization and coordination handled by	K1

	operating system	
CO4	Describe and analyze the memory management and its allocation policies	K3
CO5	Identify use and evaluate the storage management policies with respect to different storage management technologies.	K3

Subject Title	Advanced Operating Systems	Semester	III
Subject Code	18P3ITE10	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	**Operating Systems:** Introduction - Operating System: Operating System Interface - Multilevel Views of an Operating System - Categories of Operating System - Contemporary Operating System - 64 Bit Operating System. **Processes and threads:** Introduction – Processes – Threads - Multiprogramming.	K1	**12**
II	**System Performance:** General Concepts of Modeling - Simple Models of Computer System - Performance of Computer System. **Process scheduling:** Introduction - General Types of Scheduling – Processor Scheduling Concepts - CPU Scheduling Policies.	K2	**12**
III	**Synchronization Principles:** Introduction – Basic Synchronization Principles - Approaches for Implementing Synchronization. **Deadlocks:** Introduction - Basic Principles of Deadlock – Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection and Recovery.	K1	**12**
IV	**File Management:** Introduction – Files - Access Methods - Directory Function. **The I/O System:** Introduction - I/O Hardware -Device I/O Structure - I/O Performance Optimization - Hard Disk I/O Scheduling. **Memory Management:** Introduction - Process Address Space - Contiguous Memory Allocation - Non - Contiguous Memory Allocation.	K3	**12**
V	**Security and Protection:** Introduction – Problems of Security - Security and Production Components - System Vulnerabilities. **Networking and Distributed Systems:** Ethernet - Internetworking and TCP/IP - World Wide Web - Parallel Computing. **Virtual Machines:** Introduction - Overall Virtual Machines Structures - Hardware Interface.	K3	**12**

Learning Resources

Text Books	1. Jones and Barlett, "Principles of Modern Operating Systems", Second Edition, 2012.
Reference Books	1. Operating System in depth: Design & Programming, Thomas.W,Doeppner, First Edition 2010. 2. The Linux Programming Interface: A Linux and Unix System Programming handbook, Michal Kerisk, First Edition, 2010. 3. Advanced Concepts in Operating Systems", Mukesh Singhal, Niranjan G.Shivarathr, 2011. 4. Richard Petersen, The Complete Reference – Linux , TMH sixth edition 2011.
Web Sites/Links	1. www.cs.iit.edu 2. www.cs.fsu.edu

Content beyond the syllabus:

1. About Psim3
2. Java Modeling Framework

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

Subject Title	**Ubiquitous Computing**	**Semester**	**III**
Subject Code	**18P3ITE11**	**Specialization**	**NA**
Type / Hours	**Elective Course / 60 Hours**	**L:T:P:C**	**4 : 0 : 0 : 4**

COURSE OBJECTIVE

- To prepare base for ubiquitous computing.
- To gain knowledge on ubiquitous concepts

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Understand the major concepts and components of wireless and mobile networks	K1
CO2	Describe and discuss the next generation mobile systems (e.g., smart phones, tablets) and their application areas	K2

CO3	Introduce the principles of distributed computing, mobile computing and their applications	K1
CO4	Explain and show the ability to implement concepts related to the design and utilization of smart (mobile) systems.	K3
CO5	Demonstrate basic knowledge in developing smart phone applications using various platforms, toolkits, APIs and third-party libraries.	K3

Subject Title	Ubiquitous Computing	Semester	III
Subject Code	18P3ITE11	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Basics and Vision: Modelling the Key Ubiquitous Computing Properties, Ubiquitous System Environment Interaction Architectural Design for UbiCom Systems: Smart DEI Model Applications: Past and Present: Everyday Applications in the Virtual, Human and Physical World, Achievements from Early Projects and Status Today Smart Devices and Services: Service Architecture Models, Service Provision Life cycle, Virtual Machines and Operating Systems	K1	12
II	Smart Mobiles, Cards and Device Networks: Smart Mobile Devices, Users, Resources and Code, Operating Systems for Mobile Computer and Communicator Devices, Smart Card Devices, Device Networks Human Computer Interaction: User Interfaces and Interaction for Four Widely Used Devices, Hidden UI via Basic Smart Devices, Hidden UI via Wearable and Implanted Devices, Human Centred Design (HCD).	K2	12
III	Context-Aware Systems: Modelling Context Aware Systems, Mobility Awareness, Spatial Awareness, Temporal Awareness: Coordinating and Scheduling, ICT System Awareness Intelligent Systems (IS): Basic Concepts, IS Architectures, Semantic KB IS, Classical Logic IS, Soft Computing IS Models, Applications Autonomous Systems and Artificial Life: Basic Autonomous Intra-Acting Systems, Reflective and Self-Aware Systems, Self-Management and Autonomic, Computing, Complex Systems, Artificial Life	K1	12
IV	Ubiquitous Communication: Audio Networks, Data Networks, Wireless Data Networks, Universal and Transparent Audio, Video and Alphanumeric Data Network Access, Ubiquitous Networks, Further Network Design Issues Management of Smart Devices: Managing Smart Devices in Virtual Environments, Managing Smart Devices in Human User Centred Environments, Managing Smart Devices in Physical Environments Ubiquitous System	K3	12
V	Challenges and Outlook: Overview of Challenges, Smart Devices, Smart Interaction, Smart Physical Environment Device Interaction, Smart Human Device Interaction, Human Intelligence versus Machine Intelligence, Social-issues: Promise versus Peril Reference	K3	12

Learning Resources

Text Books	1. Stefan Poslad ,"Ubiquitous Computing: Smart Devices, Environments and Interactions" by Wiley, 2008.
Reference Books	1. **Mostefaoui, Soraya Kouadri** ,"Advances in Ubiquitous Computing: Future Paradigms and Directions: Future ...", IGI Publication,2008.
Web Sites/Links	1. www.ubiq.com 2. www.techopedia.com

Content beyond the syllabus:

1. Ubiquitous Computing tools
2. Knowing about pervasive computing

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

Subject Title	Compiler Design	Semester	III
Subject Code	18P3ITE12	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To understand, design and implement a lexical analyzer, design and implement a parser, design code generation schemes, optimization of codes and runtime environment

COURSE OUTCOME

CO Number	CO Statement	Knowledge Level
CO1	Specify and analyse the lexical, syntactic and semantic structures of advanced language features	K1

CO2	Separate the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation	K2
CO3	Describe techniques for intermediate code and machine code optimisation	K1
CO4	Design the structures and support required for compiling advanced language features	K3
CO5	Write a scanner, parser, and semantic analyser without the aid of automatic generators	K3

Subject Title	Compiler Design	Semester	III
Subject Code	18P3ITE12	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens	K1	12
II	Role of the parser, Writing Grammars – Context – Free Grammars – Top Down parsing – Recursive Descent parsing – Predictive parsing – bottom – up parsing – shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser	K2	12
III	Intermediate Languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – procedure calls	K1	12
IV	Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole optimizaion	K3	12
V	Introduction – Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.	K3	12

Learning Resources	
Text Books	1. Alfred Aho, Ravi Sethi, Jeffy D.Ullman, "Compilers – Principles, Techniques and Tools", Pearson Education Asia, 2011.
Reference Books	1. .Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2013. 2. Kenneth C. Louden, 'Compiler Construction : Principles and Practices ', Thompson Learning, 2011.
Web Sites/Links	1. www.tutorialspoint.com/compiler_design/

Pedagogy : Chalk and Talk, PPT ,ICT……..

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓			
CO2	✓		✓	✓
CO3	✓	✓		
CO4	✓	✓	✓	
CO5	✓	✓	✓	✓

IV SEMESTER

Subject Title	Adhoc and Sensor Networks	Semester	IV
Subject Code	18P4ITC12	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To study the protocols and the functionalities of ad hoc networks,
- Understanding the various applications developed based on ad hoc networking, addressing issues and challenges created.
- To know about the sensor networks and addressing the challenges in establishing infrastructure for sensor networks and managing database.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the Concepts, Network Architecture and Applications of Ad-hoc and Wireless Sensor Networks	K1
CO2	Analyze the protocol design issues of Ad-hoc Networks.	K2
CO3	Know the design of routing protocols for ad-hoc and wireless networks.	K3
CO4	Learn the Concepts, Architecture of ad-hoc and sensor networks and MAC layer protocols.	K3 & K4
CO5	Evaluate the QOS related performance measurements of ad-hoc and sensor networks.	K4

Subject Title	Adhoc and Sensor Networks	Semester	IV
Subject Code	1P4ITC12	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	INTRODUCTION AND MAC PROTOCOLS Cellular and Ad hoc Networks - Issues in Ad hoc Networks - Design Issues and Design Goals of MAC protocol for Ad hoc Networks - Classification of MAC protocols - Contention Based Protocols - Reservation and Scheduling Mechanisms - Other Protocols.	K1	12
II	ROUTING PROTOCOLS Design Issues and Classifications of unicast and multicast Routing Protocols - Proactive, Reactive and Hybrid routing protocol – Tree based and Mesh based multicast protocols.	K2	12
III	TRANSPORT LAYER AND SECURITY ISSUES Design Issues, Design Goals and Classifications of Transport layer protocols - Security in Ad hoc Networks - Network Security Requirements - Network Security Attacks - Key Management.	K3	12
IV	SENSOR NETWORKS AND NETWORKING SENSORS Unique Constraints and Challenges – Advantages and Applications – Collaborative Processing – Key Definitions – Localization and Tracking – Networking Sensors – MAC – Geographic, Energy Aware and Attribute based Routing.	K4	12
V	INFRASTRUCTURE ESTABLISHMENT AND NETWORK DATABASE Topology Control – Clustering – Time Synchronization – Localization and Localization Services – Task Driven Sensing – Roles of Sensor Nodes and Utilities.	K4	12

Learning Resources

Text Books	1. C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2nd Edition, 2005. 2. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks – An Information Processing Approach", Elsevier Publications, 2004.
Reference Books	1. C.K.Toh, "Ad hoc Mobile Wireless Networks – Protocols and Systems", Pearson Education, 1st Edition, 2007. 2. George Aggelou, "Mobile Ad hoc Networks – From Wireless LANs to 4G Networks", Tata McGraw Hill, 2009. 3. Holger Karl and Andreas Willing, "Protocols and Architectures for Wireless Sensor Networks" Wiley Publications, 2005.
Web Sites/Links	1. www.uta.edu 2. www.oldcitypublishing.com

Content beyond the syllabus:

1. Motivation and applications of ad hoc networks
2. Knowing about mobile ad hoc networks
3. Applications of sensor networks

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓
CO5			✓	✓

Subject Title	Digital Image Processing	Semester	IV
Subject Code	18P4ITC13	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	5 : 0 : 0 : 4

COURSE OBJECTIVE

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Review the fundamental concepts of a digital image processing system.	K1
CO2	Analyze images in the frequency domain using various transforms.	K2
CO3	Evaluate the techniques for image enhancement and image restoration.	K3
CO4	Categorize various compression techniques.	K3 & K4
CO5	Interpret Image compression standards.	K4

Subject Title	Digital Image Processing	Semester	IV
Subject Code	18P4ITC13	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	5 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction: What is Digital Image Processing? – Examples of Fields that Use Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System - Digital Image Fundamentals: Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image Sensing and Acquisition – Image Sampling and Quantization – Some Basic Relationships between Pixels.	K1	12
II	Image Enhancement in the Spatial Domain: Background. Some Basic Gray Level Transformations - Histogram Processing- Enhancement Using Arithmetic/Logic Operations- Basics of Spatial Filtering- Smoothing Spatial Filters. Image Enhancement in the Frequency: Background - Introduction to the Fourier Transform and the Frequency Domain- Smoothing Frequency-Domain Filters- Sharpening Frequency Domain Filters- Homomorphic Filtering- Implementation.	K2	12
III	Image Restoration: A Model of the Image Degradation / Restoration Process- Noise Models- Restoration in the Presence of Noise Only– Spatial Filtering - Estimating the Degradation Function- Inverse Filtering- Minimum Mean Square Error (Wiener) Filtering. Color Image Processing: Color Fundamentals- Color Models- Pseudo color Image Processing- Basics of Full-Color Image Processing- Color Transformations- Smoothing and Sharpening- Image Segmentation Based on Color - Noise in Color Images- Color Image Compression.	K3	12
IV	Object Recognition: Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Syntactic Pattern Recognition – Optimization Techniques - Fuzzy Systems – Mathematical Morphology – Basic Morphological Concepts – Binary Dilation and Erosion.	K3 & K4	12
V	Image Data Compression: Image Data Properties – Discrete Image Transforms in Image Data Compression – Predictive Compression Methods – Vector Quantization – Hierarchical and Progressive Compression Methods – Comparison of Compression Methods – Coding – JPEG and MPEG Image Compression - Texture.	K4	12

Learning Resources	
Text Books	1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Prentice Hall, Third Edition, 2008. (Unit I to III : Chapter-1,2,3,4,5&6) 2. Sonka, Hlavac, Boyle, "Digital Image Processing and Computer Vision", Cengage Learning, Fourth Indian Reprint 2011. (Unit-IV:Chapters: 9&13,Unit-V:Chapters: 14&15)
Reference Books	1. Anil.K.Jain, "Fundamentals of Digital Image Processing ", Prentice Hall, 1989. 2. Chanda & Majumdar, "Digital Image Processing and Analysis", Prentice Hall 3rd Edition.
Web Sites/Links	1. www.nptel.ac.in 2. www.imageprocessingplace.com/ 3. www.slideshare.net/sahilbiswas/image-processing

Content beyond the syllabus:

1. Understanding about MATLAB
2. Knowing about Image processing tools

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓
CO5			✓	✓

Subject Title	Digital Image Processing Using MATLAB	Semester	IV
Subject Code	18P4ITP06	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

Objective

- To understand about digital image processing

LIST OF EXPERIMENTS:

1. Implement image enhancement technique
2. Histogram equalization
3. Image restoration
4. Implement image filtering
5. Edge detection using operators
6. Image compression
7. Image subtraction
8. Boundary extraction using morphology
9. Image segmentation

Subject Title	Dissertation and Viva Voce	Semester	IV
Subject Code	18P4ITPR02	Specialization	NA
Type	Core Course	L:T:P:C	0 : 0 : 0 : 8

FIRST REVIEW: **(10 Marks)**

1. Problem Identification
2. Problem definition
3. Presentation

SECOND REVIEW: **(10 Marks)**

1. Project Analysis
2. Design & Module description

FINAL REVIEW: **(20 Marks)**

1. DFD / ERD / System Flow Diagram (Whichever Applicable)
2. Coding and Implementation
3. Presentation
4. Final Project Report (with executable format including complete source code)

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

ELECTIVES

Subject Title	Enterprise Resource planning	Semester	IV
Subject Code	18P4ITE13	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.
- To focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach.
- To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.
- To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Make basic use of Enterprise software, and its role in integrating business functions	K1
CO2	Analyze the strategic options for ERP identification and adoption.	K2
CO3	Design the ERP implementation strategies	K3
CO4	Create reengineered business processes for successful ERP implementation.	K4
CO5	Classify different processes of the organization and relationship among all processes.	K4

Subject Title	Enterprise Resource planning	Semester	IV
Subject Code	18P4ITE13	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	Introduction: Enterprise An Overview-Introduction to ERP-Basic ERP concepts-Benefits of ERP.ERP and Technology: ERP and Related Technologies-Business Process Reengineering (BPR)-Data Warehousing,-Data Mining- LAP- SCM.	K1	12
II	ERP Implementation Lifecycle- Implementation Methodology: Hidden Costs-Organizing the Implementation-Vendors and Consultants-Contracts with Vendors-Consultants and Employees-Project Management and Monitoring.	K2	12
III	Business modules in an ERP Package-Finance- Manufacturing-Human Resources-Plant Maintenance-Materials Management-Quality Management-Sales and Distribution	K3	12
IV	ERP Market Place- SAP AG-People soft-Baan-JD Edwards- Oracle-QAD-SSA	K4	12
V	Turbo Charge the ERP System- EAI- ERP and E-business- ERP and Internet- Future Directions	K4	12

Learning Resources

Text Books	1. Alexis Leon, "ERP Demystified", Second Edition, Tata McGraw Hill, New Delhi, 2009.
Reference Books	1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000. 2. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001. 3. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003
Web Sites/Links	3. http://www.webopedia.com/TERM/E/ERP.html. 4. https://erp.iitkgp.ernet.in/. 5. www.epicor.com/solutions/erp.aspx

Content beyond the syllabus:

1. ASAP methodologies in ERP.
2. Agile techniques using enterprise software implementation.
3. ERP Software

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓
CO5			✓	✓

Subject Title	Neural Networks	Semester	IV
Subject Code	18P4ITE14	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To learn about the concepts and techniques in neural networks
- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.	K1
CO2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic	K2
CO3	To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations	K2 & K3
CO4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications	K4
CO5	Reveal different applications of these models to solve engineering and other problems.	K3 & K4

Subject Title	Neural Networks	Semester	IV
Subject Code	18P4ITE14	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	INTRODUCTION: What is neural network? Human brain, models of a neuron, neural network viewed as directed graphs, feedback, Network architectures, knowledge representation, artificial intelligence and Neural Networks.	K1	12
II	LEARNING PROCESSES: Introduction, error correction algorithm, memory based learning, Hebbian learning, competitive learning, Boltzmann learning, learning with a teacher , learning without a teacher, Learning tasks, memory, adaptation.	K2	12
III	SINGLE LAYER PERCEPTRONS: Introduction, perceptron, and perceptron convergence theorem, examples, multilayer perceptron – introduction and some preliminaries.	K2 & K3	12
IV	Back propagation algorithm, summary of the Back propagation algorithm, XOR Problem, and Heuristics for making the Back propagation algorithm to perform better.	K4	12
V	MEMBERSHIP FUNCTIONS: Features of membership functions, standard forms and boundaries, fuzzification, membership value assignment, Fuzzy to crisp conversions: lambda cuts for fuzzy sets, lambda cuts for fuzzy relations, defuzzification methods.	K3 & K4	12

Learning Resources

Text Books	1. Neural Networks: A comprehensive foundation by Simon Haykin, McMillan college public company, Newyork, 1994. 2. Neural Networks by Satish Kumar, Tata McGraw Hill, 2009. 3. Fuzzy logic with engineering applications – Timothy. J. Ross, McGraw Hill International Edition, 1997.
Reference Books	1. Introduction to Artificial Neural Systems- Jacek M. Zurada Jaico publishing House 2012. 2. Artificial neural networks – B. Yegnanarayana prentice hall of India 1999. 3. Neural network design – Martin T. Hagan, Cengage learning,2009 4. Neural network and Fuzzy Systems, A Dynamical systems approach to machine intelligence – Bart Kosko, Prentice Hall of India publications, 2006 5 . Neural networks using MATLAB 6.0 – S.N. Shivanandam , S.Sumathi and S.N. Deepa Tata Mcgarw - Hill 2009. 6. Fuzzy Logic, Intelligence, Control, and Information –John Yen, Rena Langari, Pearson Education 2005.
Web Sites/Links	1. www.doc.ic.ac.uk 2. www.coursera.org

Content beyond the syllabus:

1. Applications of neural networks
2. Understanding neural networks with more examples

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2		✓	✓	
CO3		✓	✓	
CO4	✓	✓		
CO5	✓	✓		✓

Subject Title	Big Data Analytics	Semester	IV
Subject Code	18P4ITE15	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- To understand the applications using Map Reduce Concepts.
- To learn to use various techniques for mining data stream.

- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.	K1
CO2	Identify the characteristics of datasets and compare the trivial data and big data for various applications.	K2
CO3	Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.	K2
CO4	Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.	K3 & K4
CO5	Integrate machine learning libraries and mathematical and statistical tools with modern technologies like hadoop and map reduce.	K4

Subject Title	Big Data Analytics	Semester	IV
Subject Code	18P4ITE12	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	**INTRODUCTION TO BIG DATA** Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.	K1	**12**
II	**MINING DATA STREAMS** 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.	K2	**12**
III	**HADOOP:** History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics- Developing a Map Reduce Application-How Map Reduce Works- Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features.	K2	**12**
IV	**HADOOP ENVIRONMENT:** Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration- Security in Hadoop - Administering Hadoop – HDFS - Monitoring- Maintenance-Hadoop benchmarks- Hadoop in the cloud.	K3 & K4	**12**
V	**FRAMEWORKS :** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.	K4	**12**

Learning Resources	
Text Books	1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 2. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012.
Reference Books	1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012 2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
Web Sites/Links	1. www.greatlearning.in 2. www.edx.org

Content beyond the syllabus:

1. Big data analysis techniques.
2. Design efficient algorithms for mining the data from large volume.

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		✓
CO2	✓		✓	✓
CO3		✓	✓	
CO4	✓			✓
CO5	✓		✓	✓

Subject Title	Theory of Computation	Semester	IV
Subject Code	18P4ITE16	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

COURSE OBJECTIVE

- Learning about automata, grammar, language, and their relationships.
- Understanding of the power of Turing machine, and the decidable nature of a problem. Also, gives the idea on some new trends and applications.

COURSE OUTCOME

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

CO Number	CO Statement	Knowledge Level
CO1	Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.	K1
CO2	Demonstrate their the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.	K2
CO3	Prove the basic results of the Theory of Computation	K2 & K3
CO4	State and explain the relevance of the Church-Turing thesis.	K4
CO5	Understand and conduct mathematical proofs for computation and algorithms	K3 & K4

Subject Title	Theory of Computation	Semester	IV
Subject Code	18P4ITE16	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Unit	Syllabus Contents	Levels	Number of Sessions
I	REGULAR LANGUAGES : Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions - Regular Expression – FA and Regular Expressions – Pumping lemma for Regular languages - Equivalence and minimization of Finite Automata.	K1	12
II	CONTEXT FREE LANGUAGES : Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Equivalence of Parse trees and derivation - Normal forms for CFG - Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG – Pumping lemma for CFL.	K2	12
III	CLOSURE PROPERTIES and Turing machines 8 Closure properties of Regular Sets: Complement and Intersection – Closure properties of CFL: Union, Concatenation, Kleene Closure, Intersection and Complement – Turing Machines – Language of a Turing machine – Turing machine as a computing device - Various techniques for construction of TMs – Equivalence of one tape and multi-tape Turing machines.	K2 & K3	12
IV	UNDECIDABILITY 8 A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Rice theorem for Recursive and Recursively enumerable languages – Post's Correspondence Problem.	K4	12
V	RECENT TRENDS & APPLICATIONS 9 Matrix grammar – Programmed grammar – Random context grammar – Regular Control grammar – Lindenmayer systems – A glance on DNA computing and Membrane computing.	K3 & K4	12

Learning Resources

Text Books	1. John E. Hopcroft and Jeffery D. Ullman, Introduction to Automata Theory, Languages and Computations, Narosa Publishing House, Delhi, 1989. 2. Kamala Krithivasan and R. Rama, Introduction to Formal Languages, Automata Theory and Computation, Pearson Education, Delhi, 2009.
Reference Books	1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd, 2003. 2. J. Martin, Introduction to Languages and the Theory of Computation, Third Edition, Tata Mc Graw Hill, New Delhi, 2003. 3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Learning, 1997.
Web Sites/Links	www.theoryofcomputation.in

Pedagogy : Chalk and Talk, PPT ,ICT etc…

MAPPING WITH PROGRAM SPECIFIC OUTCOMES

CO PSO	PSO1	PSO2	PSO3	PSO4
CO1	✓	✓		
CO2		✓	✓	
CO3		✓	✓	
CO4	✓	✓		
CO5	✓	✓		✓