

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
[AUTONOMOUS]

M.Sc., (INFORMATION TECHNOLOGY)

(Candidates admitted from 2017-2018 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 two Tests - | 10 Marks |
| 2. Seminar | - 05 Marks |
| 3. Assignment | - 05 Marks |
| 4. Attendance | - 05 Marks |

Total	= 25 Marks
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Internal Assessment Marks for Practical

- | | |
|----------------|------------|
| 1. Attendance | - 10 Marks |
| 2. Observation | - 10 Marks |
| 3. Test | - 20 Marks |

Total	= 40 Marks
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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 University Examinations, the passing minimum shall be 50 % out of 60 Marks. (30 Marks)

Distribution of Marks

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

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

INTERNAL

The Passing minimum shall be 13 out of 25 marks

VII. ELIGIBILITY FOR EXAMINATION

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

A candidate will be permitted to appear for the University 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.

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

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

- 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.
- 60% and above but below 75 % shall be declared to have passed the examinations in first class without Distinction.
- 50%and above but below 60% shall be declared to have passed the examinations in second class.
- 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 University 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 2017-18 (i.e.) for the students who are to be admitted to the first year of the course during the academic year 2017-18 and thereafter.

Candidates who were admitted to the PG course of study before 2017-2018 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 2018-2019. 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: 5x5= 25

Answer all the questions

One Question from each unit (either or type)

PART- B: 5x10 = 50

Answer all the questions

One Question from each unit (either or type)

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 Project

Review I : 10 Marks

Review II : 10 Marks

Review III : 20 Marks

EVALUATION PATTERN – Project

Evaluation (External) : 40 Marks

Viva-voce (Internal, External) : 20 Marks

**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN [AUTONOMOUS]
ELAYAMPALAYAM, TIRUCHENGODE -637 205.
DEPARTMENT OF COMPUTER APPLICATIONS
M.Sc. – INFORMATION TECHNOLOGY**

**COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER CBCS
for the Candidates admitted from the year 2017-2018**

Sem	Course Code	Courses	Credits	Hours	Marks		
					I.A. Marks	E.E. Marks	Total Marks
I	17P1ITC01	Core Course-I - Object Oriented Analysis and Design	4	4	25	75	100
	17P1ITC02	Core Course-II - Advanced Computer Architecture	4	4	25	75	100
	17P1ITC03	Core Course-III - Design and Analysis of Algorithms	4	4	25	75	100
	17P1ITC04	Core Course-IV- PHP Programming	4	4	25	75	100
	17P1ITE	Elective Course- I	4	4	25	75	100
	17P1ITP01	Core Course-V- PHP Programming Lab	2	4	40	60	100
	17P1ITP02	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	17P2ITC05	Core Course-VI – Multimedia Technology	4	4	25	75	100
	17P2ITC06	Core Course-VII - Software Project Management and Quality Assurance	4	4	25	75	100
	17P2ITC07	Core Course-VIII – Network Security and Cryptography	4	4	25	75	100
	17P2ITC08	Core Course-IX – Open Source Technologies	4	4	25	75	100
	17P2ITE	Elective Course -II	4	4	25	75	100
	17P2ITP03	Core Course-X - Multimedia Technology Lab	2	4	40	60	100
	17P2ITP04	Core Course-XI – Open Source Technologies Lab	2	4	40	60	100
	-	Library / Net Lab	-	1	-	-	-
	-	Student Personality Development	-	1	-	-	-
TOTAL			24	30	205	495	700
III	17P3ITC09	Core Course-XII – Mobile Computing	4	4	25	75	100
	17P3ITC10	Core Course-XIII – Internet of Things	4	5	25	75	100
	17P3ITC11	Core Course-XIV – Advanced Database Management Systems	4	5	25	75	100
	17P3ITE	Elective Course- III	4	4	25	75	100
		EDC- I	2	4	25	75	100
	17P3ITP05	Core Course-XV- Communication and Networking Lab	2	4	40	60	100
	17P3ITPR01	Core Course-XVI – Mini Project	2	2	40	60	100
		Human Rights	1	-	25	75	100
	-	Library / Net Lab	-	1	-	-	-
	-	Student Personality Development	-	1	-	-	-
TOTAL			23	30	230	570	800

IV	17P4ITC12	Core Course-XVII –Ad hoc and Sensor Networks	4	4	25	75	100
	17P4ITC13	Core Course-XVIII – Digital Image Processing	4	5	25	75	100
	17P4ITE	Elective Course -IV	4	4	25	75	100
	17P4ITP06	Core Course –XIX- Digital Image Processing Using MATLAB	2	4	40	60	100
	17P4ITPR02	Core Course-XX - Dissertation and Viva-Voce (In-house Project)	8	-	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=93	109	795	1905	2700

EDC-EXTRA DISCIPLINARY 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 2017-2018.

ELECTIVE COURSES**Elective-I**

Course Code	Course Name
17P1ITE01	Distributed Computing
17P1ITE02	Soft Computing
17P1ITE03	Cloud Computing

Elective-II

Course Code	Course Name
17P2ITE04	Grid Computing
17P2ITE05	Real Time Embedded Systems
17P2ITE06	Information Retrieval

Elective-III

Course Code	Course Name
17P3ITE07	Green Computing
17P3ITE08	Advanced Operating Systems
17P3ITE09	Ubiquitous Computing

Elective-IV

Course Code	Course Name
17P4ITE10	Enterprise Resource Planning
17P4ITE11	Neural Networks
17P4ITE12	Big Data Analytics

Subject Title	Object Oriented Analysis and Design	Semester	I
Subject Code	17PIITC01	Specialization	NA
Type	Core Course	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To understand the basic principles of object orientation with design. To understand the basic concepts and terms of object orientation and the associated UML notation. 			
Unit	Syllabus Contents		Number of Sessions
I	An overview of object oriented systems development – Object Basics - object oriented systems development life cycle.		12
II	Object Oriented Methodologies: Introduction - Rumbaugh Object Modeling Technique – The Booch Methodology – The Jacobson Methodologies – Patterns – Frameworks – The Unified Approach.		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.		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.		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.		12

Learning Resources

Text Books	1. Ali Bahrami, “Object Oriented Systems Development”, 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

Subject Title	Advanced Computer Architecture	Semester	I
Subject Code	17PIITC02	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
To provide in-depth coverage of current and emerging trends in computer architectures, focusing on performance and the hardware/software interface.			
Unit	Syllabus Contents	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.	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.	12	
III	Computer Arithmetic: ALU-Integer Representation: Sign magnitude representation-Two's 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.	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.	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.	12	

Learning Resources	
Text Books	1. Computer Organization & Architecture-Designing for Performance by William Stallings, Ninth Edition, 2012, PEARSON Prentice Hall Publication.
Reference Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

Subject Title	Design and Analysis of Algorithms	Semester	I
Subject Code	17PIITC03	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> • Analyze the asymptotic performance of algorithms. • Write rigorous correctness proofs for algorithms. • Demonstrate a familiarity with major algorithms and data structures. • Apply important algorithmic design paradigms and methods of analysis. • Synthesize efficient algorithms in common engineering design situations. 			
Unit	Syllabus Contents	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.	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.	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.	12	
IV	Optimal binary - search tree – Knapsack problem – Backtracking – N-Queens problem – Hamiltonian circuit problem – subset sum problem.	12	
V	Branch and bound: Assignment problem – Knapsack problem – Traveling salesman problem. – Approximation algorithms for NP-hard NP Complete Problems.	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

Subject Title	PHP Programming	Semester	I
Subject Code	17PIITC04	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To introduces the PHP framework and syntax, and covers in depth the most important techniques used to build dynamic web sites. 			
Unit	Syllabus Contents		Number of Sessions
I	Introduction – Server Side Scripting – PHP Basics: Syntax And Variables – Comments – Simple Types – Output.		12
II	PHP Control Structures and functions – Branching – Looping – Functions – Functions and variable scope – User Defined Functions – Function Scope.		12
III	PHP Arrays – Creating Arrays – Retrieving Values – Multidimensional Arrays – Inspecting Arrays – Deleting from Arrays – Iteration.		12
IV	String Handling – Strings in PHP – String Functions – Number Handling – Numerical Types – Mathematical Operators – Simple Mathematical Functions – Randomness – Regular Expression in PHP.		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.		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.

Subject Title	PHP Programming Lab	Semester	I
Subject Code	17P1ITP01	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.

Subject Title	Algorithms Lab	Semester	I
Subject Code	17P1ITP02	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

Subject Title	Multimedia Technology	Semester	II
Subject Code	17P2ITC05	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To formulate a working definition of interactive multimedia To demonstrate the use of animation, digitized sound, video control, and scanned images To develop conceptual maps of content and process for interactive multimedia instructional programs 			
Unit	Syllabus Contents	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	12	
II	Sound/Audio: Basic Sound Concepts – Music – Speech, Images and Graphics: Basic Concepts – Computer Image Processing.	12	
III	Video and animation: Basic concepts – television – computer based animation. Data Compression: Basic compression techniques - JPEG – MPEG – DVI.	12	
IV	Multimedia Communication System: Application Subsystem – Transport subsystem, User Interfaces.	12	
V	Multimedia Application: Introduction –Media Composition – Media Integration – Media Communication – Media Entertainment.	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 Tsihriziz “ 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:

- How to consume the media?
- Knowing H.261 format
- Knowledge about optical storage media

Subject Title	Software Project Management and Quality Assurance	Semester	II
Subject Code	17P2ITC06	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> 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 			
Unit	Syllabus Contents	Number of Sessions	
I	Introduction – Product Life – Project life cycle models - water fall model – Prototyping model – RAD model – Spiral Model – Process Models – Metrics.	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.	12	
III	Project initiation – Project Planning and Tracking – What, Cost, When and How – Organizational Processes – Assigning Resources – Project Tracking – Project Closure – When and How.	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.	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).	12	

Learning Resources	
Text Books	1. Gopaldaswamy Ramesh, “Managing Globle Software Projects” Tata McGraw Hill Publishing Company Ltd, New Delhi, 2002. 2. Pressman, Roger, “Software Engineering ", A Practitioner's approach, 7 th edition, Tata Mc-Graw Hill, 2006. 6 th 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”, 2 nd 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

Subject Title	Network Security and Cryptography	Semester	II
Subject Code	17P2ITC07	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Objectives

- 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.

Unit	Syllabus Contents	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.	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.	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.	12
IV	Web Security: Web Security Considerations- Security Sockets Layer (SSL) and Transport Layer Security (TLS) - Secure Electronic Transaction.	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.	12

Learning Resources	
Text Books	1. William Stallings, “Network Security Essentials – Applications and Standards”, 3 rd 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

Subject Title	Open Source Technologies	Semester	III
Subject Code	17P2ITC08	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To enable the students to learn the concepts of open source, XML, PHP and MYSQL 			
Unit	Syllabus Contents		Number of Sessions
I	Open Source: Definition – Application of Open Source, Advantages and disadvantages of open source –benefits of open source – commercial aspects of open source – open source operating system: introduction of Linux.		12
II	Introduction: What is XML? – Origin Of the XML Standards - Where XML Can Be Used, And What U Can Use it For. Well-Formed XML: Parsing XML – Attributes - Comments –Empty Elements - XML Declaration - Processing Instructions – Illegal PCDATA Characters - Errors in XML. Validation: Document Type Definitions.		12
III	Introduction to PHP: Sending data to the Web Browser – Variables & Strings – Programming with PHP & Creating HTML: Handling HTML Form & Operators-Validating Form Data & Arrays – Introduction to MySQL: Creating Database columns – Introduction to SQL: Inserting Records & Select Data.		12
IV	Advance SQL and MySQL:DB Design-Normal Forms - Performing Transactions - Error Handling and Debugging : Introduction – Displaying PHP Errors – PHP Debugging Techniques – Creating Custom error handlers – Using PHP with MySQL: Introduction – Connecting to MySQL – Security & Updation with PHP .		12
V	Cookies and Sessions: Making Login Page – Using Sessions – Security Methods: Preventing Spam – Preventing XSS & SQL Injection Attacks – Database Encryption - Perl-Compatible Regular Expression: Introduction – Defining Simple Patterns - Finding Matches & Using Modifiers.		12

Learning Resources	
Text Books	<ol style="list-style-type: none"> 1. David Hunter, Jeff Rafter, Joe Fawcett, Eric Vander Vlist ,Danny Ayers, John Duckett, Andrew Watt, Linda McKinnon “Beginning XML 4th Edition”, -Wiley India Pvt. Limited -2008. 2. Lary Ullman , “PHP6 AND MySQL5 For Dynamic Web Sites” -, Pearson Education – 2008.
Reference Books	<ol style="list-style-type: none"> 1. Chris Bates “Web Programming, Building Internet Applications”, 3rd Edition, April 2006, WILEY Dreamtech. 2. Michael j. Young “Step by Step XML?” Microsoft Press, 2002
Web Sites/Links	<ol style="list-style-type: none"> 1. http://www.computerworld.com/open-source-tools/five-open-source-technologies.html 2. http://searchsoa.techtarget.com/definition/XML 3. https://www.php.net 4. https://www.codecademy.com/tracks/php

Content beyond the syllabus:

1. Open Source Operating System
2. Open Source web server
3. Understanding about any Open source CASE Tool

Subject Title	Multimedia Technology Lab	Semester	II
Subject Code	17P2ITP02	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

Objective

To understand the multimedia technologies using software

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.

Subject Title	Open Source Technologies Lab	Semester	III
Subject Code	17P3ITP04	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 :2

Objective

To understand the knowledge about open source technologies.

I. Develop the following online Programs using XML.

1. To prepare CD Catalogs data as .xml file and view that data through xmlDoc object.
2. Write a program for xml validations.
3. Develop a book store data as .xml file and view that data through XML-DOM (loadXMLDoc() or loadXMLString())functions.
4. Write a simple program using SAX Events.

II. Develop the following online applications using PHP & MySQL

5. Students Feedbacks System.
6. Job Registrations.
7. Library Management System.
8. Banking Transaction System.
9. Simple Shopping Application.
10. Getting Web Data using Cookies Object.

Subject Title	Mobile Computing	Semester	III
Subject Code	17P3ITC09	Specialization	NA
Type /Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Objectives

- To impart fundamental concepts in the area of mobile computing, to provide a computer systems perspective on the converging areas of wireless networking, embedded systems, and software, and to introduce selected topics of current research interest in the field

Unit	Syllabus Contents	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.	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	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.	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.	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.	12

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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/0071477330Mobile Computing: Technology, Applications, and Service Creation”, Tata McGraw-Hill Communications Engineering, 2009
Web Sites/Links	<ol style="list-style-type: none"> 1. www.crcpress.com 2. www.mnprofessional.com 3. www.mobilecomputing.co.in 4. https://www.zebra.com/.../ 5. www.techspot.com 6. www.igi-global.com/book/

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.

Subject Title	Internet of Things	Semester	I
Subject Code	17P3ITC10	Specialization	NA
Type / Hours	Course Course / 60 Hours	L:T:P:C	5 : 0 : 0 : 4
<u>Objectives</u>			
<ul style="list-style-type: none"> To assess the vision and introduction of IoT. To understand the application areas of IoT 			
Unit	Syllabus Contents		Number of Sessions
I	Introduction: Introduction to Internet of Things – Definition & Characteristics of IoT – Things in IoT – IoT Protocols – Logical Design of IoT: IoT functional Blocks – IoT Communication Models – IoT Communication APIs.		12
II	IoT Enabling Technologies: Wireless Sensor Networks – Cloud computing – Bigdata Analytics – Communication Protocols – Embedded Systems. Domain Specific IoTs: Home Automation – cities – Retail – Health & Monitoring.		12
III	Developing IoT: Introduction – IoT Design Methodology – Case Study on IoT System for Weather Monitoring.		12
IV	IoT and M2M: Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT: Software defined Networking – Network Function Virtualization.		12
V	IoT System Management with NETCONF-YANG: Need for IoT System Management – SNMP – NETCONF – YANG. Tools for IoT: Introduction - Chef – Puppet.		12

Learning Resources	
Text Books	1. Arshdeep Bahga, Vijay Madiseti “ Internet of Things, A Hands on Approach” Universities Press 2015.
Reference Books	1. Oliver Hersent, David Boswarthick, Omar Elloumi. “ The Internet of Things – Key applications and Protocols”, Wiley, 2012.
Web Sites/Links	1. www.theinternetofthings.eu 2. www.cisco.com/c/en_in/solutions/internet-of-things/overview.html

Content beyond the syllabus:

1. knowing about smart grid
2. understanding embedded system

Subject Title	Advanced Database Management Systems	Semester	III
Subject Code	17P3ITC11	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	5 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> • 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. 			
Unit	Syllabus Contents	Number of Sessions	
I	Object Oriented Databases And Object: Relational Databases: Object oriented databases - Complex data types, Object-oriented data model, Object-oriented languages, Persistent programming languages – Object relational databases - Nested relations, Complex types, Inheritance, Reference types, Querying with complex types, Functions and procedures, Object-oriented versus object-relational.	12	
II	Distributed Databases And Parallel Databases: Distributed databases - Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases.	12	
III	Directory systems – Parallel databases - I/O parallelism, Inter query parallelism, Intra query parallelism, Intra operation parallelism, Interoperation parallelism, Design of parallel systems.	12	
IV	Specialized Databases: Spatial databases and spatial, Geographic data - Representation of geometric information - Design databases, Geographic data, Spatial queries, Indexing of spatial data – Temporal and time series databases - Time in databases- Time specification in SQL, Temporal query language.	12	
V	Other Databases: Multimedia databases – Multimedia data formats, Continuous media data, Similarity-based retrieval - Web databases – Web fundamentals, URL, HTML, Client side scripting and Applets.	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. www.studyjaar.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

Subject Title	Communication and Networking Lab	Semester	II
Subject Code	17P3ITP05	Specialization	NA
Type / Hours	Core Course / 45 Hours	L:T:P:C	4 : 0 : 0 : 2

Objective:

- To have practical understanding in internet

Experiments:

1. Simple Chat Program using TCP Sockets
2. Simulation of HTTP Protocol using TCP Sockets
3. Simulation of DNS using UDP Sockets
4. Learn to use commands like TCP Dump, Netstat, Trace Route
5. Simulation of Ping using Raw Sockets

Subject Title	Mini Project	Semester	III
Subject Code	17P3ITPR01	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)

Subject Title	Adhoc and Sensor Networks	Semester	IV
Subject Code	17P4ITC12	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> 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. 			
Unit	Syllabus Contents	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.	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, Energy Efficient and QoS guaranteed multicast protocols.	12	
III	TRANSPORT LAYER AND SECURITY ISSUES Design Issues, Design Goals and Classifications of Transport layer protocols - TCP over Ad Hoc – Security in Ad hoc Networks - Network Security Requirements - Network Security Attacks - Key Management - Secure Routing in Ad hoc Networks	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.	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 – Network Database	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

Subject Title	Digital Image Processing	Semester	I
Subject Code	17P4ITC13	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	5 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To develop experience with using computers to process images. To understand the basic principles and methods of digital image processing and able to formulate solutions to general image processing problems. 			
Unit	Syllabus Contents	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.	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.	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.	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.	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	12	

Learning Resources

Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

Subject Title	Digital Image Processing Using MATLAB	Semester	IV
Subject Code	17P4ITP05	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	17P4ITPR02	Specialization	NA
Type	Core Course	L:T:P:C	0 : 0 : 0 : 8

FIRST REVIEW: (10 Marks)

4. Problem Identification
5. Problem definition
6. Presentation

SECOND REVIEW: (10 Marks)

3. Project Analysis
4. Design & Module description

FINAL REVIEW: (20 Marks)

5. DFD / ERD / System Flow Diagram (Whichever Applicable)
6. Coding and Implementation
7. Presentation
8. 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	Distributed Computing	Semester	I
Subject Code	17PIITE01	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Objectives

- To expose students to both the abstraction and details of file systems.
- To introduce concepts related to distributed computing systems.

Unit	Syllabus Contents	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.	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.	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.	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.	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.	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 (4 th 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

Subject Title	Soft Computing	Semester	I
Subject Code	17PIITE02	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To learn basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations 			
Unit	Syllabus Contents	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.	12	
II	Back propagation Networks: Architecture of Back propagation Network-Back propagation Learning –illustrations-Effect of Tuning Parameters of the Back propagation Neural Network	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.	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.	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.	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

Subject Title	Cloud Computing	Semester	I
Subject Code	17PIITE03	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To understand the emerging area of "cloud computing" and how it relates to traditional models of computing 			
Unit	Syllabus Contents	Number of Sessions	
I	Cloud computing: Introduction to Cloud Computing – history of cloud computing – client/server computing – peer-to-peer computing – distributed computing – collaboration computing – cloud computing – how cloud computing works: cloud storage – cloud architecture – cloud services – companies in the cloud – the pros and cons of cloud computing: advantages and disadvantages.	12	
II	Evolution of cloud computing-Web service delivered from the cloud - Developing cloud services-Building cloud networks - Virtualization	12	
III	Cloud Hardware and Infrastructure – Client – Security – Network – Services – Platforms. Cloud Solutions: introduction – Cloud Application Planning – Cloud Ecosystem – Cloud Business Process Management – Cloud Service Management: Key Cloud Solution Characteristics – on-premise Cloud Orchestration and Provisioning Engine – Computing On Demand (COD) – Cloud Sourcing.	12	
IV	Migrating to the Cloud: Cloud Services for individuals – Cloud Services Aimed at the Mid-Market – Enterprise-Class Cloud Offerings – Migration – Mobile Internet devices and the cloud - Best practices and the Future of Cloud Computing: Analyze your Service – Best Practices – How Cloud Computing Might Evolve.	12	
V	Security in cloud: Overview-Cloud Security Challenges- Software as a Service – Common standards in cloud computing - Symmetric ciphers: Classical encryption techniques – Data Encryption Standard – Advanced Encryption Standard – Multiple Encryption and Triple DES. Asymmetric ciphers: Public-key cryptography and RSA – Cryptographic hash function – Message authentication code.	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 1. Cloud Computing web – based applications at change the way you work & Collaborate online”, Michael miller,pearson. 2. ”Cloud Computing” 2nd edition, Dr.Kumarsaurabh,wiley India. 3. “Cryptography and Network Security” principles and practices – William Stallings. 5th Edition.
Reference Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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.

Subject Title	Grid Computing	Semester	II
Subject Code	17PIITE04	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To understanding about the generation and programming models of grid computing 			
Unit	Syllabus Contents	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.	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.	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.	12	
IV	Grid architecture and technologies: The anatomy of the grid – the physiology of the grid.	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.	12	

Learning Resources	
Text Books	1. Fran Berman, Geoffrey C.Fox, Anthony J.G.Hey, “Grid Computing” Wiley INDIA edition, 2012.
Reference Books	1. Barry Wilkinson, “Grid computing techniques and applications” CRC Press, Chapman and Hall book, 2009.
Web Sites/Links	1. www.cs.fsu.edu 2. www.cse.iitd.ernet.in

Content beyond the syllabus:

1. Analysis of fault tolerant using grid
2. Understanding about grid computing tools

Subject Title	Real Time Embedded Systems	Semester	II
Subject Code	17P2ITE05	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
The main objective is to provide the fundamental concepts of embedded system and its applications.			
Unit	Syllabus Contents	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.	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.	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.	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.	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).	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Embedded System Design, ARNOLD S.BERGER, South Asian Edition – 2005. 2. Embedded System Design, Frank Vahid/tony givargis – reprint – 2009.
Web Sites/Links	<ol style="list-style-type: none"> 1. www.sciencedirect.com 2. www.embedded.com 3. www.futureelectronics.com

Content beyond the syllabus:

1. Embedded system applications
2. Embedded system simulation tools

Subject Title	Information Retrieval	Semester	II
Subject Code	17P2ITE06	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
<u>Objectives</u>			
<ul style="list-style-type: none"> Understand the basic knowledge information retrieval 			
Unit	Syllabus Contents	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.	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.	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.	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.	12	
V	DOCUMENT TEXT MINING Information filtering; organization and relevance feedback – Text Mining - Text classification and clustering – Categorization algorithms: naive Bayes; decision trees; and nearest neighbor – Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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.

Subject Title	Green Computing	Semester	III
Subject Code	17PIITE08	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4: 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> 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 			
Unit	Syllabus Contents		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.		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.		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.		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		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.		12

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. webs.wichita.edu 2. www.ukessays.com

Content beyond the syllabus:

1. Roads to green computing
2. Green computing tools

Subject Title	Advanced Operating Systems	Semester	III
Subject Code	17PIITE09	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> To learn the fundamentals of Operating Systems. To gain knowledge on Distributed operating system concepts that includes architecture, Algorithms for Implementing DSM. 			
Unit	Syllabus Contents	Number of Sessions	
I	Overview: Introduction- Functions of operating systems – Design Approaches – Types of Advanced Operating Systems. Synchronization Mechanisms: Introduction – Concept of Process – Concurrent Process – The critical section Problem. Process Deadlocks: Introduction – Preliminaries – Models of Deadlocks – Models of Resources – A Graph-Theoretic Model of a System State – Necessary and Sufficient Conditions for a Deadlock.	12	
II	Architectures of Distributed Systems: Introduction – Motivation – System Architecture Types – Distributed operating Systems – Issues in Distributed operating System – Communication Network – Communication Primitives. Distributed Shared Memory: Introduction – Architecture and Motivation – Algorithms for Implementing DSM – Memory Coherence – Coherence Protocols – Design Issues.	12	
III	Multiprocessor System Architectures: Introduction – Motivations – Basic Multiprocessor System Architecture – Interconnection networks for Multiprocessor System – Caching – Hypercube Architecture. Multiprocessor Operating Systems: Introduction – Structures – Operating System Design Issues – Threads – Process Synchronization – Process Scheduling – Memory Management – Reliability/Fault Tolerance	12	
IV	Linux Operating systems: Introduction – History of UNIX and Linux – System Features – Software Features – Differences between Linux and Other Operating System – hardware requirements - sources of Linux Information. Linux Startup and Setup: User accounts – Accessing the Linux system – Unix Commands	12	
V	Linux File Structure: Linux file types – File structures – managing Files - Managing Directories – File and Directory operation. File Management Operation: File and Directory permissions – Jobs – System Administration – Shells in Linux. Shell operations: Command Line – Standard Input/output-Redirection – Pipes – Shell Scripts – Shell Variables - Arithmetic Shell Operations – Control Structures.	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 1. Advanced Concepts in Operating Systems”, Mukesh Singhal, Niranjan G.Shivarathr, 2011. 2. Richard Petersen, The Complete Reference – Linux , TMH sixth edition 2011..
Reference Books	<ol style="list-style-type: none"> 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.
Web Sites/Links	<ol style="list-style-type: none"> 1. www.cs.iit.edu 2. www.cs.fsu.edu

Content beyond the syllabus:

1. Orientation to Programming Requirements
2. Agreement Protocol

Subject Title	Ubiquitous Computing	Semester	III
Subject Code	17P1ITE11	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
Objectives			
<ul style="list-style-type: none"> The objective of the course is to prepare base for ubiquitous computing. 			
Unit	Syllabus Contents	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	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).	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	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	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	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

Subject Title	Enterprise Resource planning	Semester	IV
Subject Code	17P1ITE10	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4

Objectives

- To enable the students to learn the concepts of ERP, ERP package, SAP basics.

Unit	Syllabus Contents	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.	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.	12
III	Business modules in an ERP Package-Finance- Manufacturing-Human Resources-Plant Maintenance-Materials Management-Quality Management-Sales and Distribution	12
IV	ERP Market Place- SAP AG-People soft-Baan-JD Edwards- Oracle-QAD-SSA	12
V	Turbo Charge the ERP System- EAI- ERP and E-business- ERP and Internet-Future Directions	12

Learning Resources	
Text Books	1. Alexis Leon, “ERP Demystified”, Second Edition, Tata McGraw Hill, New Delhi, 2009.
Reference Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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

Subject Title	Neural Networks	Semester	IV
Subject Code	17PIITE11	Specialization	NA
Type / Hours	Elective Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
<u>Objectives</u>			
<ul style="list-style-type: none"> To learn about the concepts and techniques in neural networks 			
Unit	Syllabus Contents	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.	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.	12	
III	SINGLE LAYER PERCEPTRONS: Introduction, perceptron, and perceptron convergence theorem, examples, multilayer perceptron – introduction and some preliminaries.	12	
IV	Back propagation algorithm, summary of the Back propagation algorithm, XOR Problem, and Heuristics for making the Back propagation algorithm to perform better.	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.	12	

Learning Resources	
Text Books	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 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	<ol style="list-style-type: none"> 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

Subject Title	Big Data Analytics	Semester	IV
Subject Code	17P4ITE12	Specialization	NA
Type / Hours	Core Course / 60 Hours	L:T:P:C	4 : 0 : 0 : 4
<u>Objectives</u>			
<ul style="list-style-type: none"> To understand the applications using Map Reduce Concepts. To learn to use various techniques for mining data stream. To understand the various search methods and visualization techniques. To learn to analyze the big data using intelligent techniques. 			
Unit	Syllabus Contents		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.		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.		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.		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.		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.		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.