

### M.Sc. (INFORMATION TECHNOLOGY) 2017-2018

S. no	Semester	Category	Course code	Title of the paper	Maximum marks			Minimum marks for pass			Hours /week	Credits
					CIA	E.E	TOTAL	CIA	E.E	TOTAL		
1	I	Core	17P1ITC1	Java Programming	25	75	100	10	30	50	6	6
2		Core	17P1ITC2	Object Oriented Analysis and Design	25	75	100	10	30	50	6	6
3		Core	17P1ITC3	Database Management System	25	75	100	10	30	50	6	6
4		Core-PL	17P1ITCP1	Java Programming Lab	40	60	100	16	24	50	3	2
5		Core-PL	17P1ITCP2	DBMS Lab	40	60	100	16	24	50	3	2
6		Major Elective-I	17P1ITEL1A 17P1ITEL1B 17P1ITEL1C	Computer Networks / TCP-IP / Open Source Technology	25	75	100	10	30	50	6	4
7	II	Core	17P2ITC4	Internet and Web Technology	25	75	100	10	30	50	5	5
8		Core	17P2ITC5	. Net framework and C# Programming	25	75	100	10	30	50	5	5
9		Core	17P2ITC6	Cross Platform - Mobile Applications Development	25	75	100	10	30	50	5	5
10		Core	17P2ITC7	Ontological Engineering	25	75	100	10	30	50	5	5
11		Core-PL	17P2ITCP3	C# and Web Technology Lab	40	60	100	16	24	50	3	2
12		Core-PL	17P2ITCP4	Cross Platform-Mobile Applications Development Lab	40	60	100	16	24	50	3	2
13	Major Elective-II	17P2ITEL2A 17P2ITEL2B 17P2ITEL2C	Enterprise Resource Planning / Management Information System / Software Project Management	25	75	100	10	30	50	4	4	
14	III	Core	17P3ITC8	Big Data Analytics	25	75	100	10	30	50	5	5
15		Core	17P3ITC9	Cloud Based Web services	25	75	100	10	30	50	5	4
16		Core	17P3ITC10	Internet-of-Things	25	75	100	10	30	50	5	5
17		Core	17P3ITC11	Advanced Software Engineering	25	75	100	10	30	50	6	6
18		Core	17P3ITCP5	Web Services Lab	40	60	100	16	24	50	3	2
19		EDC	17P3ITEDC	M-Commerce	25	75	100	10	30	50	4	-
			Communicative Skills	-	-	-	-	-	-	2		
20	IV	Major Elective-III	17P4ITEL3A 17P4ITEL3B 17P4ITEL3C	Data Analytics Lab / Haskell Lab / Python Lab	40	60	100	16	24	50	6	4
21		Core-PL	17P4ITCP6	Object Oriented Analysis and Design Lab	40	60	100	16	24	50	4	3
22		Project	17P4ITPR	Project	40	60	100	16	24	50	-	4
23		CN	17P4ITCN	Comprehension	-	100	100	-	50	50	4	2
<b>Total Marks-2100</b>										<b>Credits - 90</b>		

### M.Sc. INFORMATION TECHNOLOGY (2017-2018)

<b>Paper Code</b>	<b>Total No. Of Papers</b>	<b>Total Marks</b>	<b>Total Credits</b>	<b>Classification</b>
Core	17	1700	72	✓
Elective	03	300	12	✓
E.D.C	01	100	-	✓
Project	01	100	04	X
Comprehension	01	100	02	✓
Soft skill using language lab	-	-	-	X
<b>Total</b>	<b>23</b>	<b>2300</b>	<b>90</b>	

**A.VEERIYA VANDAYAR MEMORIAL SRI PUSHPAM COLLEGE  
(AUTONOMOUS),  
POONDI, THANJAVUR DIST.**

**Question Pattern for UG and PG Programmes for students to be  
admitted during 2017 – 2018 and afterwards.**

**Total Marks: 75**

**QUESTION PATTERN**

**SECTION – A  
(Question 1 to 10)**

**10 x 2 = 20 Marks**

1. Short Answer Questions.
2. Two Questions from each units (All are answerable)

**SECTION – B  
(Question 11 to 15)**

**5 x 5 = 25 Marks**

1. 5 Paragraph type questions with "either / or" type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

**SECTION – C  
(Question 16 to 20)**

**3 x 10 = 30 Marks**

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>17P1ITC1</b>	<b>JAVA PROGRAMMING</b>	<b>6</b>	<b>6</b>

**Objective**

To provide an exposure on network programming in Java, how to interface with swing, the basic database connectivity, how to develop client-server programming model using servlets and JSP and also deals with component programming using Java beans.

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**UNIT- I**

**Hrs 18**

Networking Basics - Socket Programming - Proxy server - TCP/IP Sockets - Net address- datagrams.

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**UNIT- II**

**Hrs 18**

Introducing Swing: swing- components and containers - the swing packages - Painting in a Swing - Exploring Swing: JLabel and ImageIcon - JTextField - The Swing Buttons - Jtabbed - Pane - Jscroll Pane - Jlist - JComboBox - Trees- Jtable.

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**UNIT- III**

**Hrs 18**

Java Database Connectivity: JDBC Architecture - Installing the ODBC Driver - Connecting to a Database - Structured Query language. JDBC programming concept: Database URL— Executing the action commands - Query with JDBC - Populating a Database - Executing Queries - Metadata - Scrollable and Updatable Result Sets.

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**UNIT- IV**

**Hrs 18**

Introduction to Servlets- Servlets: Java Servlets: Servlet Life Cycle – Generic and HTTP Servlet - A simple Servlets - The servlet API - Servlet Package - Handling HTTP Request and Response – Servlet with Database Connectivity- Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class.

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**UNIT- V**

**Hrs 18**

Bean Development Kit - Jar Files - Introspection - Design Pattern for properties, events and methods - Constrained Properties - Persistence – Customizers.

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**Books for Study:**

1. Herbert Schildt, "**The Complete Reference Java**", Tata McGraw Hill Publishing Company Limited, Edition 7, 2007,ISBN: 9780070636774 .
2. Cays Horstmann and Gary Cornell, "**Core Java**", Volume II, Pearson Edition, 2001, ISBN: 978-0137081899 and 978-0137081608.

**Course Outcome:**

To provide an exposure on network programming in Java, how to interface with swing, the basic database connectivity, how to develop client-server programming model using servlets and JSP and also deals with component programming using Java beans.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	17P1ITC2	<b>OBJECT ORIENTED ANALYSIS AND DESIGN</b>	6	6

**Objective**

- ❖ To understand concepts in Object Oriented Analysis and Design.

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**Unit I**

**Hrs 18**

An Overview of Object Oriented Systems Development - Object Basics - Object Oriented Systems Development Life Cycle.

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**Unit II**

**Hrs 18**

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns-Frameworks - Unified Approach - Unified Modeling Language - Use case - class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram.

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**Unit III**

**Hrs 18**

Identifying use cases - Object Analysis - Classification - Identifying Object relationships - Attributes and Methods.

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**Unit IV**

**Hrs 18**

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability.

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**Unit V**

**Hrs 18**

Designing Interface Objects - Software Quality Assurance- System Usability - Measuring User Satisfaction.

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**BOOKS FOR STUDY:**

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 1999

**REFERENCES:**

1. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw-Hill, 2003.
2. James Rumbaugh, Ivar Jacobson, Grady Booch "The Unified Modeling Language Reference Manual", Addison Wesley, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, "UML Toolkit", OMG Press Wiley Publishing Inc., 2004.

**Course Outcome:**

To understand concepts in Object Oriented Analysis and Design.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>17P1ITC3</b>	<b>DATABASE MANAGEMENT SYSTEM</b>	<b>6</b>	<b>6</b>

**Objective**

- ❖ To know concepts and techniques in DBMS.

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**Unit I**

**Hrs 18**

Introduction to Database system: Overview-View of Data-Data Models-History of Database system-E-R Model: Basic Concepts-Constraints-Keys-E-R Diagram-Weak Entity Sets-Extended E-R Features-Design of an E-R Data base Schema-Reduction to ER Schema.

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**Unit II**

**Hrs 18**

Relational Model-Structure of Relational Database-Relational Algebra-Extended ,Additional Algebra Operations-Modification of Database -Tuple Relational calculus-Domain Relational Calculus -SQL:Background-Basic Structure -Set Operations-Aggregate Functions-Nullvalues-Nested Subqueries-View .

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**Unit III**

**Hrs 18**

Integrity and Security-Advanced SQL:domain integrity-Referential integrity-Assertion-Application Design and Development-Triggers-Encryption and Authentication-Relational Data base design-1NF-2NF-BCNF-3NF-5NF.

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**Unit IV**

**Hrs 18**

Storage and file Structures:- Overview of Physical storage media-Magnetic disks-RAID-Tertiary Storage-Storage Access-File Organization-organization of records in files-Data Dictionary Storage-Indexing and Hashing:-Basic concepts-Ordered indices-B+ tree index files-B-tree index files.

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**Unit V**

**Hrs 18**

Transaction Concept-Transaction states-Implementation of Atomicity and Durability-Concurrent Executions-Serializability-Recoverability-Implementations of Isolation-Testing for Serializability. Concurrency Control:-Lock-Based Protocols-Timestamp-Based Protocols-Validation-Based Protocols-Multiple Granularity-Deadlock Handling.

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**References:**

1."Database System concepts", Abraham Silber Schatz, Henk F.Korth, S.Sudarsan, Fifth Edition, 2006, Tata McGraw Hill.

**General References:**

1. Fred Mc Fadden, Jeffery A Hoffer, Mary B.prescott, "Modern Database Management", 5 Edition, Addison Wesley, 2000.
2. Elmasri, Navathe, "Fundamentals of Database System", Third Edition, Addison wesley, 2000.
3. Jeffrey D.Ulman, Jenifer widomj, "A First Course in Database System", pearson Education Asia, 2001
4. Bipin c Desai, "An Introduction to Database System", Galgotia publications Pvt Limited, 2001.

**Course Outcome:**

To know concepts and techniques in DBMS.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
<b>I</b>	<b>17P1ITCP1</b>	<b>JAVA PROGRAMMING LAB</b>	<b>3</b>	<b>2</b>

### **OBJECTIVES**

1. Java program to demonstrate the use of Java Swing components, namely, buttons, text boxes, lists/combos, menus etc
2. Java program to store, delete and update data in a database with the support of JDBC-ODBC connectivity
3. Java program with Servlets to create a dynamic HTML form to accept and display user name and password with the help of 'get()' and 'post()' methods
4. Java Servlet program for 'auto refreshing' the webpage after given period of time
5. Java Servlet program to demonstrate the use of cookies
6. Java Servlet program to demonstrate the use of session
7. Java program with Servlets to store only valid data in a database with the support of JDBC-ODBC connectivity

### **Course Outcome:**

To apply application features through Java.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>17P1ITCP2</b>	<b>DBMS Lab</b>	<b>3</b>	<b>2</b>

**Objective**

❖ To apply RDBMS features through Oracle.

1. Library information processing.
2. Students mark sheet processing.
3. Telephone directory maintenance.
4. Gas booking and delivering system.
5. Electricity bill processing.
6. Bank transaction (SB)
7. Pay roll processing.
8. Inventory.
9. Question database and conducting quiz.
10. Purchase order processing.

**Course Outcome:**

To apply RDBMS features through Oracle.



Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
I	17P1ITEL1A	<b>Major Elective - I COMPUTER NETWORKS</b>	<b>6</b>	<b>4</b>

**Objective**

- To know about various layers of computer network architecture.
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**Unit I**

**Hrs 15**

**Introduction To Networks And Communication Media:** Uses- Network Hardware - Network software - Reference Models - Example Network- Network standardization. Basis for data communication- Transmission media- Wireless Transmission- Telephone system - Satellite Communication.

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**Unit II**

**Hrs 20**

**The Data Link Layer:** Data Link Layer design issues - Error Detection and Correction Methods - Elementary Data Link protocols - sliding Window protocols - Verification Methods Channel Allocation- Multiple Access protocols- IEEE 802 Standards.

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**Unit III**

**Hrs 15**

**The Network Layer:** Network Layer design issues - Routing algorithms- Congestion Control algorithms - Internetworking - Network Layer in Internet.

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**Unit IV**

**Hrs 20**

**The Application Layer:** Application Layer design issues- Domain Names System - Electronic Mail - Word Wide Web - Multimedia - Other Application- Network Security- Basic Cryptography-DES-RSA.

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**Unit V**

**Hrs 20**

**Network Security:** Introduction - Cryptography - Symmetric key algorithm - Public key algorithms - communication security

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**Reference:**

- Andrews S.Tanenbaum, "Computer Networks", prentice Hall of India private Limited,(4Edition),2003 - Unit I to V

**General Reference:**

- Leon Garcia and Widjaja, "Communication Networks - Fundamental Concepts and key architecture", Tata McGraw Hill, 2001.

**Course Outcome:**

- To know about various layers of computer network architecture.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
I	17P1ITEL1B	Major Elective – I TCP/IP	6	4

**Objective**

- ❖ To know about protocol design for network.

**Unit I**

**Hrs 18**

**Introduction:** Inter Networking concepts - Applications level - Network level interconnection - Internet Architecture - Inter Connection through IP Routers, Internet Addresses - Mapping Internet addresses to physical addresses (ARP)- Determining an Internet addresses at startup (RARP)

**Unit II**

**Hrs 18**

**Internet protocol:** Datagram Delivery - Routing IP datagram's error and control messages (ICMP) - classless and subnet addresses extensions - User Datagram protocols - (UDP)

**Unit III**

**Hrs 18**

**Routing protocols:** Routing cores - peers - routing algorithms - Autonomous System - Exterior Gateway protocol - Internet Multicasting - Multicast Routing protocols - Internet Group Management protocol (IGMP)

**Unit IV**

**Hrs 18**

**TCP / IP over ATM:** ATM hardware - ATM cell transport - Adaptation Layer - IP address binding in ATM network - Logical IP subnet - ATMARP. **Socket Interface:** UNIX I/O - Networks I/O - Creating sockets - Connecting sockets - obtaining information about hosts, Networks, protocols, services.

**Unit V**

**Hrs 18**

**Application protocols:** Domain Name System - File transfer & access (FTP, TFTP, NFS)-electronic mail (SMTP, MIME)-Network management (SNMP)-Internet Security.

**Reference:**

1. Douglas E. Comer, "Internetworking with TCP/IP principles, protocols, and Architectures", prentice Hall of India private Ltd., 4 Edition, 2002.

**General Reference:**

1. Behrouz A. Forouzan, "TCP /IP Protocols Suite", Tata Mc Graw - Hill,2000.

**Course Outcome:**

- To know about protocol design for network.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	17P1ITEL1C	<b>Major Elective - I OPEN SOURCE TECHNOLOGY</b>	6	4

**Objective**

- ❖ To know about the techniques and concepts of Open source technology.

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**Unit I**

**Hrs 18**

**Introduction:** shell programming: shell - pipes and redirection - shell as a programming language - shell Syntax.

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**Unit II**

**Hrs 18**

**Working with Files:** File structure - Library functions - Low - level File Access - The standard I/O Library - File & Directory Maintenance.

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**Unit III**

**Hrs 18**

Reading from & Writing to the Terminal - Terminal Structure - Terminal output - Debugging: Types of error - General debugging Techniques.

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**Unit IV**

**Hrs 18**

**Process management:** Process structure - Starting new process - Signals - Threads - Thread attributes - Canceling a Thread.

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**Unit V**

**Hrs 18**

**Internet programming:** CGI: From elements - Sending information to the WWW server - Returning HTML to the client.

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**Reference:**

1. Beginning LINUX programming - Neil Mathew & Richard Stones - Shroff Publications & Distributors Pvt Ltd., 1999.Chapters: Only relevant topics from chapters 1-3, 5,9,10-11& 20.

**General Reference:**

1. Professional LINUX Microprogramming - Richard Stones& Neil Mathew, 2001
2. WWW.advacedlinuxprogramming. com
3. WWW tdlp.Com4.WWW.stk.org

**Course Outcome:**

To know about the techniques and concepts of Open source technology.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
<b>II</b>	<b>17P2ITC4</b>	<b>INTERNET AND WEB TECHNOLOGY</b>	<b>5</b>	<b>5</b>

### Objective

- To understand the basic concepts of HTML
- To give insight for JavaScript
- To imbibe the programming concepts of PHP
- To imbibe the necessary knowledge of the tools useful for creating dynamic website

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### Unit I

**Hrs 18**

**HTML:** Basic HTML, The Document body, Text, Hyperlinks, Adding more formatting, Lists, Tables, Using colors and images, Images, Multimedia objects, Frames, Forms-towards interactivity, Cascading Style Sheets: Introduction, Using styles: Simple exam-ples, Defining your own styles, Properties and values in styles.

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### Unit II

**Hrs 18**

**Client Side Scripting : JavaScript:**JavaScript—The basics, Variables, String manipula-tion, Mathematical functions, Statements, Operators, Arrays, Functions- Data and ob-jects in java script, Regular expressions, Exception Handling, Built in objects, Events. Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, writing to a different frame, Rollover buttons, Mov-ing images, multiple pages in a single download, A text-only menu system, Floating logos.

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### Unit-III

**Hrs 18**

**Server Side Scripting: PHP:** PHP Introduction – syntax of PHP - Variables – Constants - PHP operators – Flow of controls – PHP looping – Arrays . PHP Functions – PHP and Object Oriented Programming – PHP access specifiers.

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### Unit-IV

**Hrs 18**

PHP cookie – Session – Server variables – header() – Code reuse functions. PHP files – Introduction – Testing files – Accessing files – Functions for Directories - MySQL Database: Need for Database – MySQL Database, Insert, Query, Fetch Array

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### Unit-V

**Hrs 18**

Select, Order by, Joins, Update, Delete, Groupby functions, Data Formats- Case Studies.

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### Books for Study:

1. N.P Gopalan,J.Akilandeswari, "Web Technology" A Developer's Perspective, Prentice Hall of India Private Limited, New Delhi, 2008.
2. K.Meena, R.Sivakumar and A.B.Karthick Anand Babu, "Web Programming Using PHP and MySQL", Himalaya Publishing House, First Edition 2012.ISBN: 978-9350515815.

**Books for Reference:**

1. Robin Nixon, "**Learning PHP, MySQL & JavaScript With jQuery, CSS & HTML5**"  
O'Reilly Media, Fourth edition, December 2014, ISBN:978-1-491-91866-1.
2. David R. Brooks, "**An Introduction to HTML and JavaScript for Scientists and Engineers**", Springer-Verlag London Limited 2007, ISBN-13: 978-1-84628-656-.

**Course Outcome:**

- To understand the basic concepts of HTML
- To give insight for JavaScript
- To imbibe the programming concepts of PHP
- To imbibe the necessary knowledge of the tools useful for creating dynamic website

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>17P2ITC5</b>	<b>.NET FRAMEWORK AND C# PROGRAMMING</b>	<b>5</b>	<b>5</b>

**Objective**

- To understand Programming techniques in c#.
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**UNIT – I**

**Hrs 15**

**The NET Architecture:**

The Vision and goals of .NET – The Building blocks of .NET – An overview of .NET framework: The .NET Evolution – Design goals of the .NET framework – The .NET framework Architecture – An overview of .NET application.

**UNIT – II**

**Hrs 20**

**Class overview:**

Introduction to C# - Data types – Operators – Flow Control – Methods and Parameters – Fields – Instance Methods.

**UNIT – III**

**Hrs 20**

**Advanced of Class:**

Access Modifier – Static – Extension Methods – Nested Class – Partial Class – Inheritance – Interface – Value Types.

**UNIT – IV**

**Hrs 20**

Exception Handling – Generics (Basic, Methods) – Delegates and Lambda Expressions – Events Delegates & Lambda Expressions - Building Custom collections – More collection interfaces – Primary collections class

**UNIT – V**

**Hrs 20**

Multithreading (Basic, Working with System. Threading, Asynchronous Tasks – Cancelling a Task, Thread Synchronization)

**Reference Book**

Essential C# 6.0, 5th Edition - **Mark Michaelis & Eric Lippert**

**Course Outcome:**

To understand Programming techniques in c#.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>II</b>	<b>17P2ITC6</b>	<b>Cross Platform - Mobile Applications Development</b>	<b>5</b>	<b>5</b>

**Unit I  
Mobile Development Using Xamarin**

**Hrs 15**

What is Xamarin – What’s new: Mobile Development Techniques – Mobile UI – Xamarin Forms Custom Renderers – Building Mobile User Interfaces – Xamarin Forms Architecture – Platform UI Specification Approach – Xamarin Forms or a Platform-Specific UI.

**Unit II  
Xamarin Views**

**Hrs 15**

Xamarin Forms - Creating Xamarin Forms Solution –Adding Xamain.Forms views – UI Design Using Layouts – Xamarin Forms Layouts – Android Layout – iOS Layout

**Unit III  
Xamarin Controls**

**Hrs 15**

Xamain. Forms Views – Android controls – iOS controls – Making a Scrollable List – Data Adapters – Xamarin. Forms Listview – Android Listview – iOS Table View

**Unit IV  
Navigation & Database**

**Hrs 15**

Navigation Patterns – Xamarin. Forms Navigation – android Navigation – iOS Navigation – Data Access with SQLite and Data Binding.

**Unit V  
Custom Renderers & Cross – Platform Architecture**

**Hrs 15**

Custom Renderers – Preparing custom renderers – Creating Custom renderers – android, iOS, Windows phone custom renderers – Cross platform Architecture – Shared code and Platform specific code – Core Library – PCL – Dependency Injection.

**Text book:**

Xamarin Mobile Application Development: Cross-Platform C# and Xamarin. Forms Fundamentals 2015 by Dan Hermes, Apress.

**Course Outcome:**

- Design the right user interface for mobile application.
- Implement mobile application using UI toolkits and frameworks.
- Design a mobile application that is aware of the resource constraints of mobile devices.
- Develop web based mobile application that accesses internet and location data.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>17P2ITC7</b>	<b>ONTOLOGICAL ENGINEERING</b>	<b>5</b>	<b>5</b>

**Objective**

- ❖ To understand various ontological Engineering.

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**Unit1: Theoretical Foundation of Ontologies**

**Hrs 15**

From Ontologies towards Ontologies Engineering - What is Ontologies - Main components of an Ontologies - Types of Ontologies - Ontologies Commitments-Principles for the Design of Ontologies.

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**Unit II: The most outstanding Ontologies**

**Hrs 15**

Knowledge Representation Ontology - Top level Ontologies - Linguistic Ontologies -Domain Ontologies.

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**Unit III: Methodologies and methods for Building Ontology**

**Hrs 15**

Ontologies Development Process - Ontology Methodology Evolution-Ontology Development methods and Methodologies - Method for Re-Engineering Ontologies - Ontologies learning Methods - Ontology Merging Methods and methodologies - Co4: a Protocol for Cooperative Construction of Ontologies - Methods for Evaluating Ontologies.

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**Unit IV: Languages for Building Ontologies**

**Hrs 15**

Ontology Language Evolution - Selection of ontology Language-Traditional Ontology Language-Ontology Mark up Languages.

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**Unit V: Ontology Tools**

**Hrs 15**

Ontology Tools Evolution - Ontology Development Tools and Tools Suites - Ontology Merge Tools – Ontology - based Annotation Tools.

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**Text Books:**

1. Asuncion Gomez-perez, Mariano Fernandez-Lopez and Oscar Corcho. "Ontological Engineering", Springer 2<sup>nd</sup> Printing, 2011.

**Course Outcome:**

To understand various ontological Engineering.



Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
<b>II</b>	<b>17P2ITCP3</b>	<b>C# AND WEB TECHNOLOGY LAB</b>	<b>3</b>	<b>2</b>

**Objective**

- To understand Programming techniques in c#.

**Objective**

- To understand Programming techniques in c#.

**Programs**

1. C# program for Ascending & Descending order.
2. C# Program for Matrix Multiplication.
3. C# program for stack and queue collections.
4. C# Program to perform various string operations.
5. Write a program in C# Sharp to find the factorial of a given number using recursion.
6. Writing a C# program using Extension Methods to generate Random File Name concept into Date Time class, FileCopy concept into the DirectoryInfo class.
7. Writing a C# Program to find the sum of Number using Delegates to print each step.

**PHP Applications**

8. Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.
9. Write a PHP program that adds products that are selected from a web page to a shopping cart.
10. Write a PHP program to access the data stored in a MYSQL table.
11. Write a PHP program interface to create a database and to insert a table into it.  
Write a PHP program using classes to create a table.

**Course Outcome:**

To understand Programming techniques in c#.

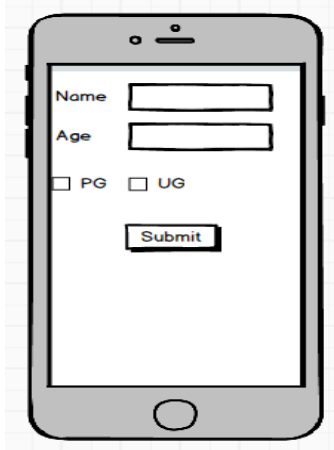
Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>17P2ITCP4</b>	<b>Cross Platform - Mobile Applications Development Lab</b>	<b>3</b>	<b>2</b>

**OBJECTIVES**

- Building mobile applications.
- Availing variety of mobile brands and models for testing objectives in same location.
- Pushing the innovation in mobile applications.

**Perform the experiments in J2ME / Android SDK framework**

1. Timer: Create a Page, change the background and Foreground colour randomly using Xamarin Timer.
2. Platform Specific: Create a form like below based on the platform change the Font Name, Font Size and display the form information in the Message Box.



3. Zoom: Using Pinch gesture class to Zoom the image in Xamarin Forms.
4. Animation: Create a button, using button click event animate images in Xamarin Forms.
5. Dependency Service: Using Dependency Service find the sum of a number, which enters by the user in the Xamarin Forms.
6. Android DB: Store & Retrieve the Form data into the SQLite.
7. Windows Phone DB: Store & Retrieve the Form data into the SQLite.
8. Navigation: Implementing Navigation using Pushing and Popping and Handling the Back button.
9. Master Detail Page: Create Navigation drawer using the MasterDetailPage.
10. Tabbed Page: Using Tabbed page load different page based on Tab click, one tab form should be implemented Popup menu handling.

**Course Outcome:**

- Building mobile applications.
- Availing variety of mobile brands and models for testing objectives in same location.
- Pushing the innovation in mobile applications.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
<b>II</b>	<b>17P2ITEL2A</b>	<b>Major Elective- II ENTERPRISE RESOURCE PLANNING</b>	<b>4</b>	<b>4</b>

**Objective**

- \* To know about the Peer-to-Peer computing techniques.

**Unit I**

**Hrs 12**

Integrated Management Information - seamless Integration - Supply Chain Management - Integrated data Model - Benefits of ERP - Business Engineering and ERP - Definition of Business engineering - principles of business engineering - Business engineering with information technology.

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**Unit II**

**Hrs 12**

Building the Business model - ERP implementation - an Overview - Role of Consultant, Vendors and Users, Customization - precautions - ERP post implementation options - ERP Implementation Technology - Guidelines for ERP Implementation.

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**Unit III**

**Hrs 12**

ERP domain - MPG / PRO - IFS /Avalon - Industrial and financial System - Baan IV SAP - Market Dynamics and dynamic strategy.

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**Unit IV**

**Hrs 12**

Description - Multi - Client Server solution - Open technology - User Interface - Application Integration.

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**Unit V**

**Hrs 12**

Basic architectural Concepts - The system control interfaces - Services - presentation interface - Database Interface.

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**Reference:**

1. Vinod kumar Garg and N.K. Venkita Krishnan, "Enterprise Resource Planning - Concepts and practice", Ph, 1998.

**General Reference:**

1. Jose Anonio Fernandez, "The SAP R/3 Handbook", Tata Mc Graw Hill publications, 1998.

**Course Outcome:**

- To know about the Peer-to-Peer computing techniques.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>II</b>	<b>17P2ITEL2B</b>	<b>Major Elective- II MANAGEMENT INFORMATION SYSTEM</b>	<b>4</b>	<b>4</b>

**Objective**

- To know about various information systems required to design MIS.

**Unit – I** **Hrs 12**

**Foundation of Information Systems in business:** Foundation concepts: Information systems in business – Foundation concepts: The component of Information systems.

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**Unit – II** **Hrs 12**

Competing with Information Technology: Fundamentals of Strategic Advantage – Using Information Technology for Strategic Advantage.  
E-Business systems: E-Business systems – Functional Business systems.

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**Unit – III** **Hrs 12**

Enterprise Business Systems: Getting All the Geese Lined Up: Managing at the Enterprise Level – Customer Relationship Management: The Business Focus – Enterprise Resource Planning: The Business Backbone – Supply Chain Management: The Business Network.

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**Unit – IV** **Hrs 12**

Electronic Commerce Systems: Electronic Commerce Fundamentals – E-Commerce Applications and Issues.

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**Unit – V** **Hrs 12**

Decision Support Systems: Decision Support in Business – Artificial Intelligence Technologies in Business.

**Reference:**

1. "Management Information Systems " , James A O'Brien, George M Marakas, Ramesh Behl, Ninth Edition, TMH Publications, 2010.

**General Reference:**

1. "Management Information System", Gordon B. Davis Margre the H.Olson, Mc Graw Hill, 3rd Reprint 2000.

**Course Outcome:**

- To know about various information systems required to design MIS.

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
<b>IV</b>	<b>17P2ITEL2C</b>	<b>Major Elective- II SOFTWARE PROJECT MANAGEMENT</b>	<b>4</b>	<b>4</b>

**Objective**

- ❖ To know about various information systems required to design MIS.

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**UNIT-I**

**Hrs 12**

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

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**UNIT-II**

**Hrs 12**

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections. The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

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**UNIT-III**

**Hrs 12**

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective. Work Flows of the process: Software process workflows, Iteration workflows.

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**UNIT-IV**

**Hrs 12**

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning. Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment.

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**UNIT-V**

**Hrs 12**

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants. Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions.

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**TEXT BOOKS:**

1. Software Project Management, Walker Royce: Pearson Education, 2005.

**REFERENCE BOOKS:**

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw- Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005

**Course Outcome:**

To know about various information systems required to design MIS.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
<b>III</b>	<b>17P3ITC8</b>	<b>Big Data Analytics</b>	<b>5</b>	<b>5</b>

**Objectives:**

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

**Unit I : Introduction to Big Data, Hadoop and NoSQL**

**Hrs 15**

Introduction to Big Data, Big Data characteristics, types of Big Data, Traditional vs. Big Data business approach, Case Study of Big Data Solutions - What is Hadoop? Core Hadoop Components; Hadoop Ecosystem; Physical Architecture; Hadoop limitations - What is NoSQL? NoSQL business drivers - NoSQL case studies - NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns - Using NoSQL to manage big data: What is a big data NoSQL solution? - Understanding the types of big data problems - Analyzing big data with a shared-nothing architecture - Choosing distribution models: master-slave versus peer-to-peer - Four ways that NoSQL systems handle big data problems

**Unit II: Map Reduce and the New Software Stack**

**Hrs 15**

**Distributed File Systems** : Physical Organization of Compute Nodes, Large-Scale File-System Organization - **MapReduce**: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures - **Algorithms Using MapReduce**: Matrix-Vector Multiplication by MapReduce , Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union, Intersection, and Difference by MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Matrix Multiplication, Matrix Multiplication with One MapReduce Step.

**Unit III: Finding Similar Items and Mining Data Streams**

**Hrs 15**

Applications of Near-Neighbor Search, Jaccard Similarity of Sets, Similarity of Documents, Collaborative Filtering as a Similar-Sets Problem - **Distance Measures**: Definition of a Distance Measure, Euclidean Distances, Jaccard Distance, Cosine Distance, Edit Distance, Hamming Distance - **The Stream Data Model**: A Data-Stream-Management System, Examples of Stream Sources, Stream Query, Issues in Stream Processing - **Sampling Data in a Stream** : Obtaining a Representative Sample , The General Sampling Problem, Varying the Sample Size - **Filtering Streams**: The Bloom Filter, Analysis - **Counting Distinct Elements in a Stream**: The Count-Distinct Problem, The Flajolet-Martin Algorithm, Combining Estimates, Space Requirements -

**Counting Ones in a Window:** The Cost of Exact Counts, The Datar-Gionis-Indyk-Motwani Algorithm, Query Answering in the DGIM Algorithm, Decaying Windows.

**Unit IV: Link Analysis and Frequent Itemsets**

**Hrs 15**

Page Rank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: Page Rank Iteration Using Map Reduce, Use of Combiners to Consolidate the Result Vector - Topic sensitive Page Rank, link Spam, Hubs and Authorities - **Handling Larger Datasets in Main Memory:** Algorithm of Park, Chen, and Yu, The Multistage Algorithm, The Multihash Algorithm - **The SON Algorithm and Map Reduce - Counting Frequent Items in a Stream:** Sampling Methods for Streams, Frequent Item sets in Decaying Windows

**Unit V: Clustering, Recommendation Systems and Mining Social-Network Graphs**

**Hrs 15**

CURE Algorithm - Stream-Computing - A Stream-Clustering Algorithm - Initializing & Merging Buckets - Answering Queries - A Model for Recommendation Systems - Content-Based Recommendations - Collaborative Filtering - Social Networks as Graphs - Clustering of Social-Network Graphs – Direct Discovery of Communities – SimRank - Counting triangles using Map-Reduce

**Text Books:**

1. Anand Rajaraman and Jeff Ullman "Mining of Massive Datasets", Cambridge University Press,
2. Alex Holmes "Hadoop in Practice", Manning Press, Dreamtech Press.
3. Dan McCreary and Ann Kelly "Making Sense of NoSQL" – A guide for managers and the rest of us, Manning Press.
4. Study Material for "Big Data Analytics" based on Stanford Info-Lab Manual, Compiled by ANURADHA BHATIA, Mumbai University.

**References:**

1. Bill Franks , "Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics", Wiley
2. Chuck Lam, "Hadoop in Action", Dreamtech Press

**Course Outcome:**

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>17P3ITC9</b>	<b>CLOUD BASED WEB SERVICES</b>	<b>5</b>	<b>4</b>

**Objective**

- To understand various services of web

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**UNIT I**

**Hrs 15**

Introduction to Web Services – XML Fundamentals - Client/Server, CORBA, JAVA RMI, Micro Soft DCOM, MOM - Components of Webservices – SOAP – WSDL – UDDI – SOAP Sever.

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**UNIT II**

**Hrs 15**

Cloud components - Cloud architecture - Cloud delivery model – SPI framework , SPI vs. traditional IT Model - Cloud deployment model - Virtualization and Cloud Computing – Web services through Cloud.

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**UNIT III**

**Hrs 15**

Web Services Interoperability – Overview of .NET and J2EE. Calling a Web Service by Using a Proxy - Creating a Simple web service - Creating and Calling a Web Service by Using Visual Studio .NET.

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**UNIT IV**

**Hrs 15**

The J2EE Web Service APIs - SOA support in J2EE – SOAP web service example in java using eclipse - RESTful webservices - Building webservices with JAX-WS – Building RESTful webservices with JAX-WS.

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**UNIT V**

**Hrs 15**

**Web Services Security** – XML security frame work, XML encryption, XML digital signature, guidelines for signing XML documents. XML Serialization in the .NET Framework.

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**Text book :** Compiled and edited by T.S.Baskaran Dept of Computer science.

2."Mastering Cloud Computing" – Rajkumar Buyya , Christian Vecchiola , S.Tamarai Selvi TATA McGraw- Hill, New Delhi - 2010

**REFERENCE BOOKS**

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter TATA McGraw- Hill , New Delhi - 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
3. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp – 2008.
4. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education, 2008.
5. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.
6. Building Web Services with Java, 2<sup>nd</sup> Edition, S. Graham and others, Pearson Edn., 2008.
7. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
8. J2EE Web Services, Richard Monson-Haefel, Pearson Education.
9. Java Web Services Programming, R.Mogha,V.V.Preetham, Wiley India Pvt.Ltd.

**Course Outcome:**

To understand various services of web



Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
<b>III</b>	<b>17P3ITC10</b>	<b>Internet-of-Things</b>	<b>5</b>	<b>5</b>

**Objectives:**

- To Understand the concepts and techniques of IoT.

**UNIT I**

**Hrs 15**

**Internet of Things Strategic Research and Innovation Agenda:** Internet of Things Vision – Internet of Common Definition – IoT Strategic Research and Innovation Directions – IoT Strategic Research and Innovation Directions – IoT Application and Use Case Scenarios – IoT Functional View – Application Areas – IoT Smart-X Applications – Smart Cities – Smart Energy and the Smart Grid – Smart Mobility and Transport – Smart Home , Smart Buildings and Infrastructure – Smart Factory and Smart manufacturing – Smart Health – Food and Water Tracking and Security – Participatory Sensing – Smart Logistics and Retail

**UNIT II**

**Hrs 15**

**Internet of Things and Related Future Internet Technologies:** Cloud Computing –IoT and Semantic Technologies – Networks and Communication – Networking Technology – Communication Technology – Processes – Adaptive and Event-Driven Processes – Processes Dealing with Unreliable Data – Processes dealing with unreliable resources – Highly Distributed Processes – Data Management – Data Collection and Analysis (DCA) – Big Data – Semantic Sensor Networks and Semantic – Annotation of data – Virtual Sensors –Security , Privacy & Trust – Trust for IoT – Security for IoT – Privacy for IoT – Device Level Energy Issues –Low Power Communication – Energy Harvesting – Future Trends and Recommendations – Related Standardization – The Role of Standardization Activities – Current Situation – Area for Additional Consideration – Interoperability in the Internet-of –Things – IoT Protocols Convergence – Message Queue Telemetry Transport (MQTT) – Constrained Applications Protocol (CoAP) – Advanced Message Queuing Protocol (AMQP) – Java Message Service API (JMS) – Data Distribution Service (DDS) – Representational State Transfer (RESET) – Extensible Messaging and Presence Protocol (XMPP)

**UNIT III**

**Hrs 15**

**Internet of Things Global Standardisation – State of Play:** Introduction – General –IoT Vision –IoT Drivers –IoT Definition – IoT Standardisation Landscape – CEN\ISO and CENELEC/IEC – ETSI – IEEE – IETF – ITU-T – OASIS – OGC – oneM2M – GS1 – IERC Research Projects Positions – BETaaS – Advisory Board Experts Position – IoT6 Position.

**UNIT IV**

**Hrs 15**

**Dynamic Context-Aware Scalable and Trust-Based IoT Security, Privacy Framework:** Introduction – Background Work – Main Concept and Motivation of the Framework – Identity Management – Size and Heterogeneity of the System – Anonymization of user Data and Metadata – Action’s Control – Privacy by Design Context Awareness – summary – A policy-based framework for Security and Privacy in Internet of Things – Deployment in a Scenario – Policies and Context Switching – Framework Architecture and Enforcement–Conclusion and Future Developments – Acknowledgments.

**Scalable Integration Framework for Heterogeneous Smart Object, Applications and Services:** Introduction – IPv6 Potential – IoT6 – IPv6 for IoT – Adapting IPv6 to IoT Requirements – IoT6 Architecture- DigCovery – IoT6 Integration with the Cloud and EPICS – Enabling Heterogeneous Integration – IoT6 Smart Office Use-case – Scalability Perspective – Conclusions.

**UNIT V**

**Hrs 15**

**Internet of Things Applications- Form Research and Innovation to Deployment:** Introduction – Open IoT – Project Design and Implementation – Execution and Implementation Issues- Project Results – Acceptance and Sustainability – Compose – Project Design and Implementation – The IoT Communication Technology - Execution and Implementation Issues – Expected Project Results.

**Text Book:**

Internet of Things – From Research and Innovation to Market Deployment by Ovidiu Vermesan and Peter Friess.

**Course Outcome:**

To Understand the concepts and techniques of IoT.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>17P3ITC11</b>	<b>ADVANCED SOFTWARE ENGINEERING</b>	<b>6</b>	<b>6</b>

**Objective**

\* To Understand advances in Development software

**UNIT I**

**Hrs 18**

**A Generic view of Process:** Layered Technology-Process Framework-Capability Maturity Model Integration-Process Patterns-Process Assessment-Personal and Team Process Models-Process Technology-Product and Process. **Process Models:** Waterfall Models-Incremental Process Model-Evolutionary Process Model-Specialized Process Model-Unified Process.

**UNIT II**

**Hrs 18**

**Requirement Engineering:** Tasks-Initiating Requirement Engineering Process-Eliciting Requirements-Developing Use case-Building Analysis Model-Negotiating Requirements-Validating Requirements. **Building Analysis Model:** Requirement Analysis –Analysis Modeling Approaches-Data Modeling Concepts-Object Oriented Analysis-Scenario Based Modeling-Flow Oriented- Class Based –Behavioral Model.

**UNIT III**

**Hrs18**

**Design Engineering:** Context of Software Engineering –Design Process and Design Quality-Design Concepts-Design model-Pattern Based Design. **Architectural Design:** Software Architecture-Data Design-Architectural Styles and Pattern-Architectural Design-Alternate Architectural Design-Mapping Data Flow. **User Interface Design:** Golden Rules-User Interface Analysis and Design-Interface Analysis-Interface Design- Design Evaluation.

**UNIT IV**

**Hrs 18**

**Testing Strategies:** Strategic Approach-Strategic Issues-Strategic for Conventional Software-Strategic for Object Oriented Software-Validation Testing-System Testing-Art of Debugging. **Testing Tactics:** Testing fundamentals-Black box Testing-White Box Testing-Basis Path Testing-Control Structure Testing-Object Oriented Testing-Testing Methods Applicable-Interclass Test Case Design-Testing for Specialized Environments-Testing Patterns.

**UNIT V**

**Hrs 18**

**Project Management:** Management Spectrum – People –Product-Process-Project-W5HH Principle-Critical Practices. **Quality Management:** Quality Concepts-Software quality Assurance-Software Reviews-Technical Reviews –Statistical SQA-Software Reliability-ISO 9000 Quality Standards-SQA Plan. **Change Management:** Software Configuration management-SCM Repository-SCM Process-Configuration Management for Web Engineering.

**References:**

1. Software Engineering (Sixth Edition) by ROGER S. PRESSMAN, McGraw-Hill International Edition, 2005.
2. Richard E.Fairley, "Software Engineering Concepts", McGraw-Hill Book Company - 1985.

**Course Outcome:**

To Understand advances in Development software

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>17P3ITCP5</b>	<b>WEB SERVICES LAB</b>	<b>3</b>	<b>2</b>

1. Development of a *Hello World* Web service with C# on Microsoft Visual Studio
2. Create a web service for temperature conversion with appropriate client program.
3. Development of a Java Web service for squaring an integer
4. Create a web service for currency conversion (at five currencies) with appropriate client program.
5. Development of a Java client application for consuming the Java Web service
6. Development of a .NET Web client application to consume the .NET Web service
7. Development of a Java client application for consuming the .NET Web service

**Course Outcome:**

- Develop the .NET and Web Services framework.
- Work with the basic and advanced features of .Net web services language.
- Create applications using various data providers.
- Develop Java Web Services

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
<b>IV</b>	<b>17P4ITCP6</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN LAB</b>	<b>4</b>	<b>3</b>

**OBJECTIVES**

- Introduction to UML notations and diagrams.
- Hands on exposure of “Visual Paradigm software for UML” involving analysis and design with UML diagrams.
  1. use case, class diagrams in online ticket reservation systems
  2. use case, class diagrams in hotel reservation systems
  3. use case, class diagrams in student information system
  4. use case, class diagrams in sales & marketing system
  5. use case, class diagrams in banking system and inventory tracking system.
  6. Behavioural diagrams for application systems
  7. state chart diagram for application systems
  8. component diagrams for systems
  9. deployment diagrams for systems – Test cases, integration test cases for systems

**Course Outcome:**

- Introduction to UML notations and diagrams.
- Hands on exposure of “Visual Paradigm software for UML” involving analysis and design with UML diagrams.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
<b>IV</b>	<b>17P4ITEL3A</b>	<b>Major Elective – III Data Analytics Lab</b>	<b>6</b>	<b>4</b>

**Objectives**

- To have a practical experience in Data Analytics.
1. Study of Hadoop ecosystem
  2. Programming exercises on Hadoop
  3. Programming exercises in No SQL
  4. Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc.
  5. Implementing any one Frequent Itemset algorithm using Map-Reduce
  6. Implementing any one Clustering algorithm using Map-Reduce
  7. Implementing any one data streaming algorithm using Map-Reduce
  8. Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web)
    - a. Twitter data analysis
    - b. Fraud Detection
    - c. Text Mining etc.

**Course Outcome:**

- To have a practical experience in Data Analytics.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
<b>IV</b>	<b>17P4ITEL3B</b>	<b>Major Elective – III HASKELL LAB</b>	<b>6</b>	<b>4</b>

**Objectives**

➤ To have a practical experience in Haskell programming.

1. TODO program
2. Rudimentary TSV to CSV
3. Calendar
4. Decode RNA
5. Bedtime story generator
6. Matrix Multiplication

**Course Outcome:**

- To have a practical experience in Haskell programming.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No.of Credits
<b>IV</b>	<b>17P4ITEL3C</b>	<b>Major Elective – III PYTHON Lab</b>	<b>6</b>	<b>4</b>

### **Objectives**

- To have a practical experience in Python programming.
- To learn simple application development

1. Basic Syntax & Operators
2. Decision Making
3. Loops
4. Data Structures
5. Functions
6. Strings
7. Modules
8. Exception Handling
9. Class and Objects
10. Inheritance
11. Operator Overloading
12. General Problems

### **Course Outcome:**

- To have a practical experience in Python programming.
- To learn simple application development



Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>IV</b>	<b>17P4ITPR</b>	<b>Project</b>	-	<b>4</b>

**Main Project**

**Objective**

- ❖ To master technical and Software development Skills.

Students have to undergo Industrial Software Development projects using recent technologies.

**Course Outcome:**

- To master technical and Software development Skills.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		<b>Core Option - SECURITY PRACTICE</b>	<b>6</b>	<b>5</b>

**COURSE OBJECTIVES**

- Understand the concepts and models of security in computing. Understand the cryptographic techniques used.
- Explain the security standards followed at the network level and at the application level.
- Estimate the level of security risk faced by an organization and the counter measures to handle the risk.
- Learn secured software development.

**UNIT I**

**SECURITY – OVERVIEW** - The Threat Environment – attackers and attacks – Security Planning and Policy – risk analysis – governance frameworks.

**UNIT II**

**CRYPTOGRAPHY-** Elements of cryptography–ciphers–encryption systems–symmetric/asymmetric–DES, AES, RSA– key management–authentication– cryptographic systems–standards – secure networks VPNs, SSL/TLS, IPSec, LAN security.

**UNIT III**

**ACCESS CONTROL** - Physical access control – access cards – authentication mechanisms – directory servers – Firewalls – packet filtering – stateful packet inspection – NAT – IDS – Firewall architectures.

**UNIT IV**

**HOST AND DATA SECURITY-** Host Hardening – OS hardening – managing vulnerabilities, permissions - data protection – Application security – issues – e-commerce security – e-mail security - Incident and Disaster Response

**UNIT V**

**SECURE CODING** - OWASP/SANS Top Vulnerabilities-Buffer Overflows-Incomplete mediation- XSS - Anti Cross Site Scripting Libraries anonical Data Format-Command Injection-Redirection-Inference–Application Controls- C Secured Software Development Life Cycle - Testing, Maintenance and Operation-Evaluation of Security Systems.

**REFERENCE BOOKS:**

1. Raymond R. Panko, "Corporate computer and network security", Second edition, Pearson, 2012.
2. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with Coding and Theory", Second Edition, Pearson, 2007.
3. Matt Bishop, "Computer Security: Art and Science", Pearson, 2003.
4. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, "Security in Coding", Pearson, 2007.
5. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson, 2004.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		<b>Core Option - SECURITY LAB</b>	<b>6</b>	<b>5</b>

**COURSE OBJECTIVES**

- Understand the application number theory in security. Study the symmetric key and public key algorithms. Understand the compression techniques for security.

**EXPERIMENTS IN THE FOLLOWING TOPICS:**

1. Write programs to implement the following number theory concept Prime and Relatively Prime Numbers Arithmetic Modulo 8 and Multiplication Modulo 8 Fermat's Theorem and Euler's Totient Function.
2. Write programs to implement the following cryptography algorithms Playfair cipher and Hill cipher  
Simplified DES algorithm  
RSA algorithm
3. Write programs to implement the following hash a MD5  
SHA-1
4. Write programs to implement the following Authentication Digital Signature and Digital Certificate  
Kerberos System X.509
5. Write a program to implement Hacking windows. BIOS Passwords.  
Windows login password Internet explorer users Changing windows visuals  
Accessing restricted drives.

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		<b>Core Option - ETHICAL HACKING &amp; CYBER FORENSICS</b>	<b>6</b>	<b>5</b>

**COURSE OBJECTIVES**

- To understand the hacking techniques of computer forensics.
- To learn about data recovery methods.
- To identify the threats in computer forensics.

**UNIT I**

**ETHICAL HACKING** - Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications.

**UNIT II**

**TYPES OF COMPUTER FORENSICS** - Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

**UNIT III**

**DATA RECOVERY** - Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

**UNIT IV**

**ELECTRONIC EVIDENCE** - Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

**UNIT V**

**THREATS** - Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

**REFERENCE BOOKS:**

1. John R. Vacca, "Computer Forensics", Firewall Media, 2004.
2. Kevin Beaver, "Hacking For Dummies", John Wiley & Sons, 2012.
3. Chad Steel, "Windows Forensics", Wiley India, 2006.
4. Majid Yar, "Cybercrime and Society", Sage Publications, 2006.  
Robert M Slade, "Software Forensics", Tata McGrawHill, 2004.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		<b>Core Option - RESOURCE MANAGEMENT TECHNIQUES</b>	<b>6</b>	<b>5</b>

**COURSE OBJECTIVES**

- Understand the Linear Programming models.
- To understand assignment and transportation problem.
- To understand the concepts of project scheduling.

**UNIT I**

**LINEAR PROGRAMMING MODELS** - Mathematical Formulation - Graphical Solution of linear programming models - Simplex method - Artificial variable Techniques- Variants of Simplex method.

**UNIT II**

**TRANSPORTATION AND ASSIGNMENT MODELS** - Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution - optimum solution - degeneracy - Mathematical formulation of assignment models - Hungarian Algorithm - Variants of the Assignment problem.

**UNIT III**

**INTEGER PROGRAMMING MODELS** - Formulation - Gomory's IPP method - Gomory's mixed integer method - Branch and bound technique.

**UNIT IV**

**SCHEDULING BY PERT AND CPM** - Network Construction - Critical Path Method - Project Evaluation and Review Technique - Resource Analysis in Network Scheduling.

**UNIT V**

**QUEUEING MODELS** - Characteristics of Queuing Models - Poisson Queues - (M / M / 1) : (FIFO /  $\infty$  /  $\infty$ ), (M / M / 1) : (FIFO / N /  $\infty$ ), (M / M / C) : (FIFO /  $\infty$  /  $\infty$ ), (M / M / C) : (FIFO / N /  $\infty$ ) models.

**REFERENCE BOOKS:**

1. Taha H.A., "Operations Research : An Introduction " 7<sup>th</sup> Edition, Pearson Education, 2008.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
3. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Company Ltd, New Delhi, 3<sup>rd</sup> Edition , 2003.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
		<b>Core Option – Rapid Application Development using Python</b>	<b>6</b>	<b>5</b>

**Objectives:**

This course aims to give a broad idea about Python Programming Language and its feature and its applications to RAD programming.

**Unit-I:**

Introduction – history of Python – features – Python Interpreter - Basic Syntax - Constants –Variable - Operators and Expressions – Strings

**Unit-II:**

Control Statements – if – while - for - continue – break statements – Data Structures- Lists –Tuples – Dictionary – Sequence - Reference Data types.

**Unit-III:**

Functions – Parameters – Arguments – return statement - Modules – Import Statement - Files I/O.

**Unit-IV:**

Object Oriented Methodology – Classes and Object – methods – Inheritance –Exceptions – errors – raising exception - Library Functions

**Unit-V:**

Applications of Python Programming - Scientific Programming – Web Programming- Graphics/Image Processing – Network Programming.

**Books for Study:**

1. Swaroop C H, "**A Byte of Python**" , 2003-2005 , Under Creative Commons Attribution-NonCommercial-ShareAlike License 2.0.

2. Allen Downey, Jeffrey Elkner, Chris Meyers, "**How to Think Like a Computer Scientist:**

**Learning with Python**", Green Tea Press, 2002., ISBN-10: 0971677506; ISBN-13:978-0971677500 .

Semester	Subject code	Title of the course	Hours of Teaching/Week	No. of Credits
		<b>Core Option - Haskell Programming</b>	<b>6</b>	<b>5</b>

**Objectives :**

To make students to have a depth knowledge in Haskell programming

**Unit I:**

Getting Started – Lists – Strings and Characters – Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching.

**Unit – II:**

Functional Programming – Infix functions – Working with Lists – Think about loops – Lambda functions – Writing a Library – Working with JSON data- Anatomy of Haskell module – Pointing JSON Data.

**Unit – III:**

Using Type Classes – Built in Type Class – Type Classes at work – I/O – Classic I/O – Working with files – Lazy I/O – I/O Monad – Buffering.

**Unit – IV:**

File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates.

**Unit – V:**

Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad.

**Book for Study:**

1. "**Real World Haskell**", O'Reilly, ISBN:0596514980 9780596514983

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>17P3CEDC/ 17P3ITEDC</b>	<b>Extra Disciplinary Course M – COMMERCE</b>	<b>4</b>	<b>-</b>

**COURSE OBJECTIVES:**

- ❖ To understand the E – commerce strategies and value chains
- ❖ To understand the M-commerce services
- ❖ To understand M – commerce infrastructure and applications.
- ❖ To know the availability of latest technology and applications of M- commerce in various domains.
- ❖ To apply mobile commerce in business-to-business application.

**UNIT I ELECTRONIC COMMERCE Hrs 12**

Introduction-The e-commerce environment-The e-commerce marketplace -Focus on portals, Location of trading in the marketplace-Commercial arrangement for transactions - Focus on auctions-Business models for e-commerce-Revenue models-E-commerce versus E-business.

**UNIT II MOBILE COMMERCE Hrs 12**

Introduction–Infrastructure Of M–Commerce–Types Of Mobile Commerce Services– Technologies Of Wireless Business–Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non–Internet Applications In M–Commerce–Wireless/Wired Commerce Comparisons

**UNIT III MOBILE COMMERCE: TECHNOLOGY Hrs 12**

A Framework For The Study Of Mobile Commerce – NTT Docomo’s I– Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy- Formulation In Mobile Communications Networks

**UNIT IV MOBILE COMMERCE: THEORY AND APPLICATIONS Hrs 12**

The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption Of Mobile Gaming Services – Location– Based Services: Criteria For Adoption And Solution Deployment – The Role Of Mobile Advertising In Building a Brand – M– Commerce Business Models

**UNIT V BUSINESS– TO– BUSINESS MOBILE E-COMMERCE Hrs 12**

Enterprise Enablement – Email and Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking And Maintenance/Management – Remote IT Support –Customer Retention – Warehouse Automation – Security.

**REFERENCE BOOKS:**

1. Dave Chaffey, "E-Business and E-Commerce Management", Third Edition, 2009, Pearson Education
2. Brian E. Mennecke, Troy J. Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IIR press, 2003.
3. P. J. Louis, "M-Commerce Crash Course", McGraw- Hill Companies February 2001.
4. Paul May, "Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business" Cambridge University Press March 2001.
5. Michael P. Papazoglou, Peter M.A. Ribbers, 'e-business organizational and Technical foundation ',Wiley India 2009
6. Dr.Pandey, SaurabhShukla E-commerce and Mobile commerce Technologies, Sultan chand, 2011

**Course Outcome:**

Explain the process that should be followed in building an E – Commerce presence.