VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
ELAYAMPALAYAM, TIRUCHENGODE - 637 205
MASTER OF COMPUTER APPLICATIONS (MCA)
COURSE STRUCTURE AND SCHEME OF EXAMINATIONS UNDER CBCS
FOR THE CANDIDATES ADMITTED FROM THE YEAR 2017-2018

SEM	COURSE CODE	TITLE	HOURS	CREDIT	CIA	EE	TOTAL
I	17P1CA01	Core Course- 1 Programming in C	4	4	25	75	100
	17P1CA02	Core Course - 2 Digital Computers and Microprocessors	4	4	25	75	100
	17P1CA03	Core Course- 3 Data Structures and Algorithms	4	4	25	75	100
	17P1CA04	Core Course- 4 Discrete Mathematics	4	4	25	75	100
	17P1CA05	Core Course- 5 Financial & Management Accounting	4	4	25	75	100
	17P1CAP01	Core Course Practical - 1 C & Data Structures Lab	5	2	40	60	100
	17P1CAP02	Core Course Practical - 2 Office Automation	5	2	40	60	100
		Total	**30**	**24**	**205**	**495**	**700**
II	17P2CA06	Core Course - 6 Object Oriented Programming with C++	4	4	25	75	100
	17P2CA07	Core Course - 7 Relational Data Base Management Systems	4	4	25	75	100
	17P2CA08	Core Course - 8 Software Engineering	4	4	25	75	100
	17P2CA09	Core Course - 9 Computer Networks	4	4	25	75	100
	17P2CA10	Core Course - 10 Operations Research	4	4	25	75	100
	17P2CAP03	Core Course Practical - 3 C++ Lab	5	2	40	60	100
	17P2CAP04	Core Course Practical - 4 RDBMS Lab	5	2	40	60	100
		Total	**30**	**24**	**205**	**495**	**700**
III	17P3CA11	Core Course - 11 Advanced Data Structures	4	4	25	75	100
	17P3CA12	Core Course - 12 . Net Programming	4	4	25	75	100
	17P3CA13	Core Course - 13 Advanced DBMS	4	4	25	75	100
	17P3CAE0_	Elective Course – I	4	4	25	75	100
		Non Core Course - EDC – 1	4	4	25	75	100
	17P3CAP05	Core Course Practical - 5 Advanced Data Structures Lab	4	2	40	60	100
	17P3CAP06	Core Course Practical – 6 . Net Programming Lab	4	2	40	60	100
	17P3CAJ01	Job Oriented Course - I Soft Skills	2	1	25	75	100
		Total	**30**	**25**	**230**	**570**	**800**

IV	17P4CA14	Core Course – 14 Advanced Java Programming	4	4	25	75	100
	17P4CA15	Core Course - 15 Open Source Technologies	4	4	25	75	100
	17P4CA16	Core Course - 16 Advanced Software Engineering	4	4	25	75	100
	17P4CA17	Core Course - 17 Data Mining and Warehousing	4	4	25	75	100
	17P4CAE0_	Elective Course – II	4	4	25	75	100
	17P4CAP07	Core Course - Practical - 7 Adv Java Lab	4	2	40	60	100
	17P4CAP08	Core Course Open Source Technologies Lab	4	2	40	60	100
	17P4CAP09	Job Oriented lab- Multimedia Lab	2	1	40	60	100
		Total	**30**	**25**	**245**	**555**	**800**
V	17P5CA18	Core Course - 18 Advanced Networks	4	4	25	75	100
	17P5CA19	Core Course - 19 Complier Design	4	4	25	75	100
	17P5CA20	Core Course - 20 Big Data Analysis	4	4	25	75	100
	17P5CAE09	Elective Course – III	4	4	25	75	100
	17P5CAE16	Elective Course – IV	4	4	25	75	100
	17P5CAP10	Core Course Practical - 9 Case Tools Lab	5	2	40	60	100
	17P5CAPR01	Core Course Project– 1	5	2	40	60	100
		Total	**30**	**24**	**205**	**495**	**700**
VI	17P6CAPR02	Core Course Project – 2 Dissertation and Viva Voce	-	18	50	150	200
		Total	**0**	**18**	**50**	**150**	**200**
		Grand Total	**150**	**140**	**1125**	**2775**	**3900**

Elective : I

	Course Code	Title
Semester III	17P3CAE01	Management Information Systems
	17P3CAE02	Graphics and multimedia
	17P3CAE03	Mobile Computing
	17P3CAE04	Advanced Operating system

Elective II

	Course Code	Title
Semester IV	17P4CAE05	Distributed Computing
	17P4CAE06	Artificial Intelligence & Expert System
	17P4CAE07	Mobile Application Development
	17P4CAE08	E-Commerce

Elective III

	Course Code	Title
Semester V	17P5CAE09	XML and Web Services
	17P5CAE10	Soft Computing
	17P5CAE11	Middleware Technologies
	17P5CAE12	Cloud Computing

Elective IV

	Course Code	Title
Semester V	17P5CAE13	Digital Image Processing
	17P5CAE14	Cryptography and Network Security
	17P5CAE15	Enterprise Resource Planning
	17P5CAE16	Internet of Things

SEMESTER – III

Subject Title	Advanced Data Structures	Semester	III
Subject Code	17P3CA11	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:
To learn about various data structures methods with implementation algorithms.

Unit	Syllabus Contents	Number of Sessions
I	**INTODUCTION:** Algorithms: Structure, properties – analysis of iterative and recursive algorithms – best case, worst case, average case complexities-Notations. **BINARY SEARCH TREES:** Operations: Insert, delete, search– implementation-Analysis.	10 Hrs
II	**AVL TREES:** Definition – Height – searching – insert, delete operations-AVL rotations – Examples. **MULTI-WAY SEARCH TREES:** m-way search trees – B-Tree – B+ trees - Tries – Operations: Insert, delete, retrieve-Examples.	10 Hrs
III	**GRAPHS:** Definition – terminologies- Representations: Adjacency matrix, Adjacency list, – Graph search methods: Breadth first Search; Depth first Search. **DIVIDE AND CONQUER:** Method – Examples – Merge sort, Binary Search– analysis.	10 Hrs
IV	**GREEDY METHOD :** Method – Examples – Minimum cost spanning tree, Kruskal's algorithm, Prim's algorithm. **DYNAMIC PROGRAMMING:** Method – Examples – All pairs shortest path problem – Traveling salesman problem.	10 Hrs
V	**BACK TRACKING:** Method–Examples-Eight queen's problem, Hamiltonian Cycles. **NP-HARD, NP-COMPLETE CLASSES :** Basic concepts – Non deterministic algorithms – Satisfiability problem – NP-hard and NP-complete Problems – Cooks theorem (informal proof).	10 Hrs

	Learning Resources
Text Books **&** **Reference Books**	1. <u>Thomas H. Cormen</u>, <u>Charles E. Leiserson</u>, <u>Ronald L. Rivest</u> and <u>Clifford Stein</u> " Introduction to Algorithms ", The MIT Press, 2009. 2. Vijayalakshmi Pai G.A, "Data Structures and Algorithms: Concepts, Techniques and Applications", Tata Mc Graw Hill. , 2009 3. 3.Horowitz Ellis, Sartaj Sahni and Sanguthevar Rajasekaran, 'Computer Algorithms/C++', Orient Black Swan, 2008. 4. 4.Horowitz Ellis and Sartaj Sahni, " Fundamental of Computer Algorithms", Galgotia publications, 2004. 5. Sartaj Sahni, " Data Structures, Algorithms and Application in C++", Orient Longman, 2000.
Web Sites / Links	1. www.computer.org 2. www.sciencedirect.com 3. www.studyyaar.com 4. www.allaboutcircuits.com 5. www.abebooks.com/

Subject Title	.Net Programming	Semester	III
Subject Code	17P3CA12	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

The main objective is to provide the concepts of dot net technologies and its applications.

Unit	Syllabus Contents	Number of Sessions
I	Introduction: Evolution & Benefits of .NET Framework- Architecture& Components of .NET Framework 3.5- CLR-CLS-CTS- Metadata and Assemblies. Introduction of C#: Need and Features of C#- Creating Console Application- Identifiers-Keywords.	10
II	Data Types, Variables and Constants: Value Types-Reference types- Pointer Types-Type Conversions- Boxing and Unboxing. Delegates and Events: Declaring Delegate- Defining & Creating Delegate objects. Flow control and exception handling: Control flow statements-selection statements- iteration statement –jump statements-exception handling-try catch finally statements –throw statements.	11
III	Introducing windows presentation foundation: main features of WPF3.5 – improved application model – improved controls- support for data validation and data binding models and LINQ. Working with WPF 3.5 controls, resources, styles , templates and commands: WPF 3.5 controls – Adding controls through XAML code – adding controls in the code behind file – container controls – simple controls – content controls.	9
IV	Data access with ADO.NET: Introducing data bases – introducing SQL - introducing ADO.NET – creating connection string – creating a connection to database – creating command objects – working with data adapters – using data reader work with databases.	10
V	The control class – the web control class – using css in web applications – the label control – button control – text box control – the file upload control – image control – the List box control –the drop down control – Validation controls: Base validator class – the required field validator control – the range validator control - regular expression validator control – compare validator control – the custom validator control .	10

	Learning Resources
Text Books	1. Ramakrishna Rao B, "Programming with C# Concepts and Practice ", Prentice Hall of India, New Delhi, 2007. 2. Jesses Liberty, "Programming C#", O' Reilly & Associates, 2001.
Reference Books	1. Tom Archer, "Inside C#", Microsoft Press, 2001. 2. Matt Telles, "C# Black Book", First Edition, Dream Tech, 2002.
Web Sites / Links	1. www.wifinotes.com 2. www.ctparts.com 3. www.indianmba.com 4. www.techopedia.com

Content Beyond the Syllabus:

1. .Net applications

2. Comparison of various .Net concepts

Subject Title	Advanced Database Management Systems	Semester	III
Subject Code	17P3CA13	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

- Understand query processing, transaction management, concurrency control etc. in distributed environment and applications of ADBMS

Unit	Syllabus Contents	Number of Sessions
I	**Introduction:** Database-System Applications-Purpose of Database Systems-View of Data-Database Languages-Relational Databases-Database Design. **Relational Databases:** Introduction to the Relational Model: Structure of Relational Databases-Database Schema-Keys-Schema Diagrams-Relational Query Languages- Relational Operations: select, project,composition of relational, union, set difference and Cartesian-product operations.	10
II	**Introduction to SQL:** SQL: Data Definition-Basic Structure of SQL Queries- Set Operations-Aggregate Functions- Null Values - Nested Subqueries- Complex Queries – Views- Modification of the Database- Joined Relations.	11
III	**Advance SQL:** SQL Data Types and Schemas-Integrity constraints-Authorization-Embedded SQL-Dynamic SQL-Functions and Procedural Constructs-Recursive Queries.	9
IV	**System Architecture:** Database- System Architectures: Centralized and Client server Architectures-Server System Architectures-Parallel Systems-Distributed Systems-Network Types. **Parallel Databases:** Introduction-I/O Parallelism- Interquery Parallelism- Intraquery Parallelism-Intraoperation Parallelism.	10
V	**Distributed Databases:** Homogeneous and Heterogeneous Databases-Distributed Data Storage-Distributed Transactions-Commit Protocols-Concurrency Control in Distributed Databases-Availability-Distributed Query	10

	Processing- Heterogeneous Distributed Databases- Directory Systems.	

Learning Resources

Text Books	1. Henry Korth, F., Abraham Silberchatz, Sudarshan, S.**,**Database System Concepts, 4th Edition , Mc Graw Hill International Editions. 2. Elmasri, R., Navathe, S.B., Fundamentals of Database Systems , Addison Wesley, 2000.
Reference Books	1. Gary Hanson,W., James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999. 2. Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill,2000. 3. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series.
Web Sites / Links	1. *www.studyyaar.com* 2. *www.itportal.in* 3. *www.ustudy.in* 4. *www.tutorialspoint.com* 5. *www.darshan.ac.in* 6. *www.ibm.com*

Content Beyond the Syllabus:
1. Database systems for advanced applications
2. Database tools

Subject Title	Management Information System	Semester	III
Subject Code	17P3CAE01	Specialization	NA
Type	Elective-I	L:T:P:C	4 : 0 : 0 : 4

Objectives:

The main objective is to provide the fundamental concepts of information system and the process of management.

Unit	Syllabus Contents	Number of Sessions
I	Foundation concepts of information systems: Fundamental roles of information – Trends in Information systems – The role of e-Business in business – Types of information systems - System Concept – Components of Information system – Information System resources – Information system activities - Meaning and Definition of MIS - MIS design, Development.	10
II	Fundamental of Strategic IT – competitive strategy concepts – Strategic uses of Information Technology – Role of information technology – Building Knowledge creating company – Knowledge Management systems - Computer Hardware Types of Computer system – Mainframe computer systems & Computer peripherals – Computer software – system software: OS – Application software –spread sheet – graphic packages	11
III	Telecommunications and Networks: Trends in Telecommunication– Telecommunication Network Model – Types of telecommunication networks – Telecommunication Media – Processors – Network Architectures and protocols.	9
IV	e-Business systems - introduction - IT in business: Functional Business Systems - Accounting, Finance, Manufacturing and Systems, Marketing - Human resource Information System – ERP – benefits and Challenges – cost of ERP – Trends in ERP. e-commerce, Scope, technologies	10
V	Strategic and managerial implication of Information system – Managing information system resources . Decision support system: Executive Information System – Artificial Information system –Expert Systems.Security, Ethical & society – ethical responsibility of Business professionals.	10

Learning Resources	
Text Books	1. Jame O'Brien, "Management Information System", Tata McGraw-Hill Publishing Company Ltd 2007(Sixth Reprint).
Reference Books	1. Woman S Jawadekar," Management Information System ", The McGraw-Hill Companies. Eight reprint 2008 2. Kenneth C.Laudon & Jane P.Laudon ," Management Information System ",Prentice Hall of India(P)Ltd 2007. 3. D.P.Goyal, "Management Information System ", Macmillan Publishers India Limited, 2010.
Web Sites / Links	5. www.wifinotes.com 6. www.ctparts.com 7. www.indianmba.com 8. www.techopedia.com

Subject Title	Team Building And Conflict Management	Semester	III
Subject Code	17P3MBAED1	Specialization	NA
Type	Extra Departmental Course	L:T:P:C	4 : 0 :0: 4

Objectives:
1. To understand the purpose and the value of team building.
2. To apply the principles of conflict resolution to make teams more effective.
3. To comprehend the value of and the techniques of conflict resolution

Unit	Syllabus Contents	Number of Sessions
I	**GROUP DYNAMICS :** Group dynamics – Importance - Functions of groups - Group Decision Making.	9 Hrs
II	**TEAM WORKING :** Team working - team roles - types of teams - team building - stages of team development - team effectiveness - Dynamics of power and politics.	9 Hrs
III	**TEAM BUILDING :** Creating Effective Teams – Turning individuals into team players – Teams and Quality Management.	9 Hrs
IV	**CONFLICT MANAGEMENT :** Conflict Management - Role of conflict - Sources of conflict – Consequences – classification of conflicts-approaches to conflict management.	9 Hrs
V	**COLLABORATION :** Collaboration – Functions - Bases - Intervention for collaboration Case studies related to concepts and application of Team building and Conflict management.	9 Hrs

Learning Resources

Text Books	1. Stephen P.Robins, **Organisational Behavior**, Prentice Hall of India, N.Delhi, 2010.
Reference Books	1. Dwivedi R.S, **Human Relations and Organisational Behaviour,** Macmillan N. Delhi, 2009 2. Udai Pareek, **Understanding Organisational Behaviour,** Oxford University Press, N.Delhi, 2011 3. Lan Brooks, **Organizational Behaviour,** Pearson Education, Delhi, 2010
WebSites / Links	1. www.changingimages.com 2. www.challengeconsulting.com 3. www.communicationandconflict.com 4. www.focusadventure.in

Content Beyond the Syllabus:
1. Team building workshops and conflict resolution
2. Conflict management skills in work spaces

Subject Title	Soft Skills	Semester	III
Subject Code	17P3CAJ01	Specialization	NA
Type	**JOB ORIENTED COURSE- I**	L:T:P:C	**2 : 0 :0: 1**
Objectives:			

To emulate students to the current needs of Software Industries and to impart self

awareness and self development to pace with the growth of IT field with hundred percent self confidence.

Unit	Syllabus Contents	Number of Sessions
I	**The Mind** - Positive thinking & Attitude, Motivation, Character Building, Self Esteem, Goal Setting.	**5Hrs**
II	**Effective Communication** - English Conversation, Pronunciation, Voice Modulation, Stressing and stretching, Accent Improvisation, Facial Expressions.	**5Hrs**
III	**Effective Communication** Body language, Writing skills. **Business Etiquettes** -Business Etiquettes Office Etiquettes, Phone Etiquettes, Dining Etiquettes, Party Etiquettes **Corporate Look** - Office Wear, Meetings/Interviews, Business Presentations	**5Hrs**
IV	**Executive Skills** - Writing a profile (Personal/ Company), Group Discussion, Facing an Interview, Business Presentation Skills.	**5Hrs**
V	**Special Corporate Skills** - Interpersonal Relationship, Leadership Qualities, Time Management, Stress Management.	**5Hrs**

Learning Resources	
Text Books	**Suggested Reading:** 1. Enhancing Employability : Connecting Campus with Corporate : M.S. Rao
Reference Books	2. Corporate Softskills : Sarvesh Gulati 3. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: Gopalaswamy Ramesh, Mahadevan Ramesh
Web Sites / Links	1. *www.dupont.co.in/soft-skill-development.* 2. *www.wfskillscollege.org.* 3. *mass.educationalinnovation.org.*

Content Beyond the Syllabus:

1. Leadership qualities
2. Professional Skills

Subject Title	Advanced Data Structures Lab	Semester	III
Subject Code	17P3CAP05	Specialization	NA
Type	Core	L:T:P:C	0: 0 : 4 : 2

Objectives:

   To give practical training in advanced Data structures.

LIST OF EXPERIMENTS	Number of Sessions
PROGRAMMING LIST: 1. To perform operations on Binary Search Trees 2. To perform operations on AVL Trees 3. To perform Graph representations : Adjacency Matrix & Adjacency List 4. Implementation of Graph Search Methods 5. To implement Binary search using Divide and Conquer method. 6. Implementation of Merge sort using Divide and Conquer method. 7. Implementation of Minimum cost spanning Trees 8. To implement Travelling salesman problem 9. To implement 8-Queens Problem	**60 Hrs**

Subject Title	.Net Programming Lab	Semester	III

Subject Code	17P3CAP06	Specialization	NA
Type	Core	L:T:P:C	0: 0 : 4 : 2

Objectives:

To explore the programming skills in .Net windows, console applications and ASP .Net.

LIST OF EXPERIMENTS	Number of Sessions
1. Write a program to accept any character from keyboard and display whether it is vowel or not. 2. Accept a character from console and check the case of the character. 3. Write a program to handle the exception 4. Create a DLL and use the function which has the DLL in another program 5. Develop a menu based .Net application to implement a text editor with cut, copy, paste, save and close operations. 6. Develop a .Net application to perform timer based quiz of 10 questions. 7. Develop a window based .Net application using Datagrid to display records. 8. Create an online bookstore that includes all validation controls available in .NET 9. Create a component that receives two numbers from the user through a Web Form, and based on the user's selection add or subtract the two numbers and returns the result to the Web Form. The result should be displayed in the Web Form using ASP.NET 10. Develop an online train ticket reservation system using .NET with the provision of insert, modify, update and delete operations.	**60 Hrs**

SEMESTER – III

Subject Title	Advanced Data Structures	Semester	III
Subject Code	17P3CA11	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

To learn about various data structures methods with implementation algorithms.

Unit	Syllabus Contents	Number of Sessions
I	**INTODUCTION:** Algorithms: Structure, properties – analysis of iterative and recursive algorithms – best case, worst case, average case complexities- Notations. **BINARY SEARCH TREES:** Operations: Insert, delete, search– implementation-Analysis.	10 Hrs
II	**AVL TREES:** Definition – Height – searching – insert, delete operations- AVL rotations – Examples. **MULTI-WAY SEARCH TREES:** m-way search trees – B-Tree – B+ trees - Tries – Operations: Insert, delete, retrieve- Examples.	10 Hrs
III	**GRAPHS:** Definition – terminologies- Representations: Adjacency matrix, Adjacency list, – Graph search methods: Breadth first Search; Depth first Search. **DIVIDE AND CONQUER:** Method – Examples – Merge sort, Binary Search– analysis.	10 Hrs
IV	**GREEDY METHOD :** Method – Examples – Minimum cost spanning tree, Kruskal's algorithm, Prim's algorithm. **DYNAMIC PROGRAMMING:** Method – Examples – All pairs shortest path problem – Traveling salesman problem.	10 Hrs
V	**BACK TRACKING:** Method–Examples-Eight queen's problem, Hamiltonian Cycles. **NP-HARD, NP-COMPLETE CLASSES :** Basic concepts – Non deterministic algorithms – Satisfiability problem – NP-hard and NP-complete Problems – Cooks theorem (informal proof).	10 Hrs

	Learning Resources
Text Books **&** **Reference Books**	6. <u>Thomas H. Cormen</u>, <u>Charles E. Leiserson</u>, <u>Ronald L. Rivest</u> and <u>Clifford Stein</u> " **Introduction to Algorithms** ", The MIT Press, 2009. 7. Vijayalakshmi Pai G.A, "Data Structures and Algorithms: Concepts, Techniques and Applications", Tata Mc Graw Hill. , 2009 8. 3.Horowitz Ellis, Sartaj Sahni and Sanguthevar Rajasekaran, 'Computer Algorithms/C++', Orient Black Swan, 2008. 9. 4.Horowitz Ellis and Sartaj Sahni, " Fundamental of Computer Algorithms", Galgotia publications, 2004. 10. Sartaj Sahni, " Data Structures, Algorithms and Application in C++", Orient Longman, 2000.
Web Sites / Links	6. <u>www.computer.org</u> 7. <u>www.sciencedirect.com</u> 8. <u>www.studyyaar.com</u> 9. <u>www.allaboutcircuits.com</u> 10. <u>www.abebooks.com/</u>

Subject Title	.NET Programming	Semester	III
Subject Code	17P3CA12	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

The main objective is to provide the concepts of dot net technologies and its applications.

Unit	Syllabus Contents	Number of Sessions
I	Introduction: Evolution & Benefits of .NET Framework- Architecture& Components of .NET Framework 3.5- CLR-CLS-CTS- Metadata and Assemblies. Introduction of C#: Need and Features of C#- Creating Console Application- Identifiers-Keywords.	10
II	Data Types, Variables and Constants: Value Types-Reference types- Pointer Types-Type Conversions- Boxing and Unboxing. Delegates and Events: Declaring Delegate- Defining & Creating Delegate objects. Flow control and exception handling: Control flow statements-selection statements- iteration statement –jump statements-exception handling-try catch finally statements –throw statements.	11
III	Introducing windows presentation foundation: main features of WPF3.5 – improved application model – improved controls- support for data validation and data binding models and LINQ. Working with WPF 3.5 controls, resources, styles , templates and commands: WPF 3.5 controls – Adding controls through XAML code – adding controls in the code behind file – container controls – simple controls – content controls.	9
IV	Data access with ADO.NET: Introducing data bases – introducing SQL - introducing ADO.NET – creating connection string – creating a connection to database – creating command objects – working with data adapters – using data reader work with databases.	10
V	The control class – the web control class – using css in web applications – the label control – button control – text box control – the file upload control – image control – the List box control –the drop down control – Validation controls: Base validator class – the required field validator control – the range validator control - regular expression validator control – compare validator control – the custom validator control .	10

Learning Resources	
Text Books	1. Ramakrishna Rao B, "Programming with C# Concepts and Practice ", Prentice Hall of India, New Delhi, 2007. 2. Jesses Liberty, "Programming C#", O' Reilly & Associates, 2001.
Reference Books	1. Tom Archer, "Inside C#", Microsoft Press, 2001. 2. Matt Telles, "C# Black Book", First Edition, Dream Tech, 2002.
Web Sites / Links	9. www.wifinotes.com 10. www.ctparts.com 11. www.indianmba.com 12. www.techopedia.com

Content Beyond the Syllabus:

3. .Net applications

4. Comparison of various .Net concepts

Subject Title	Advanced Database Management Systems	Semester	III
Subject Code	17P3CA13	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

- Understand query processing, transaction management, concurrency control etc. in distributed environment and applications of ADBMS

Unit	Syllabus Contents	Number of Sessions
I	**Introduction:** Database-System Applications-Purpose of Database Systems-View of Data-Database Languages-Relational Databases-Database Design. **Relational Databases:** Introduction to the Relational Model: Structure of Relational Databases-Database Schema-Keys-Schema Diagrams-Relational Query Languages- Relational Operations: select, project,composition of relational, union, set difference and Cartesian-product operations.	10
II	**Introduction to SQL:** SQL: Data Definition-Basic Structure of SQL Queries- Set Operations-Aggregate Functions- Null Values - Nested Subqueries- Complex Queries – Views- Modification of the Database- Joined Relations.	11
III	**Advance SQL:** SQL Data Types and Schemas-Integrity constraints-Authorization-Embedded SQL-Dynamic SQL-Functions and Procedural Constructs-Recursive Queries.	9
IV	**System Architecture:** Database- System Architectures: Centralized and Client server Architectures-Server System Architectures-Parallel Systems-Distributed Systems-Network Types. **Parallel Databases:** Introduction-I/O Parallelism- Interquery Parallelism- Intraquery Parallelism-Intraoperation Parallelism.	10
V	**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- Directory Systems.	10

Learning Resources

Text Books	3. Henry Korth, F., Abraham Silberchatz, Sudarshan, S.**,**Database System Concepts, 4th Edition , Mc Graw Hill International Editions. 4. Elmasri, R., Navathe, S.B., Fundamentals of Database Systems , Addison Wesley, 2000.
Reference Books	4. Gary Hanson,W., James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999. 5. Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill,2000. 6. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series.
Web Sites / Links	7. *www.studyyaar.com* 8. *www.itportal.in* 9. *www.ustudy.in* 10. *www.tutorialspoint.com* 11. *www.darshan.ac.in* 12. *www.ibm.com*

Content Beyond the Syllabus:
3. Database systems for advanced applications
4. Database tools

Subject Title	Team Building And Conflict Management	Semester	III
Subject Code	17P3MBAED1	Specialization	NA
Type	Extra Departmental Course	L:T:P:C	4 : 0 :0: 4

Objectives:
4. To understand the purpose and the value of team building.
5. To apply the principles of conflict resolution to make teams more effective.
6. To comprehend the value of and the techniques of conflict resolution

Unit	Syllabus Contents	Number of Sessions
I	**GROUP DYNAMICS :** Group dynamics – Importance - Functions of groups - Group Decision Making.	9 Hrs
II	**TEAM WORKING :** Team working - team roles - types of teams - team building - stages of team development - team effectiveness - Dynamics of power and politics.	9 Hrs
III	**TEAM BUILDING :** Creating Effective Teams – Turning individuals into team players – Teams and Quality Management.	9 Hrs
IV	**CONFLICT MANAGEMENT :** Conflict Management - Role of conflict - Sources of conflict – Consequences – classification of conflicts- approaches to conflict management.	9 Hrs
V	**COLLABORATION :** Collaboration – Functions - Bases - Intervention for collaboration Case studies related to concepts and application of Team building and Conflict management.	9 Hrs

Learning Resources	
Text Books	2. Stephen P.Robins, **Organisational Behavior**, Prentice Hall of India, N.Delhi, 2010.
Reference Books	4. Dwivedi R.S, **Human Relations and Organisational Behaviour,** Macmillan N. Delhi, 2009 5. Udai Pareek, **Understanding Organisational Behaviour,** Oxford University Press, N.Delhi, 2011 6. Lan Brooks, **Organizational Behaviour,** Pearson Education, Delhi, 2010
WebSites / Links	5. www.changingimages.com 6. www.challengeconsulting.com 7. www.communicationandconflict.com 8. www.focusadventure.in

Content Beyond the Syllabus:
3. Team building workshops and conflict resolution
4. Conflict management skills in work spaces

Subject Title	Soft Skills	Semester	III
Subject Code	17P3CAJ01	Specialization	NA
Type	**JOB ORIENTED COURSE- I**	L:T:P:C	**2 : 0 :0: 1**

Objectives:

  To emulate students to the current needs of Software Industries and to impart self awareness and self development to pace with the growth of IT field with hundred percent self confidence.

Unit	Syllabus Contents	Number of Sessions
I	**The Mind** - Positive thinking & Attitude, Motivation, Character Building, Self Esteem, Goal Setting.	**5Hrs**
II	**Effective Communication** - English Conversation, Pronunciation, Voice Modulation, Stressing and stretching, Accent Improvisation, Facial Expressions.	**5Hrs**
III	**Effective Communication** Body language, Writing skills. **Business Etiquettes** -Business Etiquettes Office Etiquettes, Phone Etiquettes, Dining Etiquettes, Party Etiquettes **Corporate Look** - Office Wear, Meetings/Interviews, Business Presentations	**5Hrs**
IV	**Executive Skills** - Writing a profile (Personal/ Company), Group Discussion, Facing an Interview, Business Presentation Skills.	**5Hrs**
V	**Special Corporate Skills** - Interpersonal Relationship, Leadership Qualities, Time Management, Stress Management.	**5Hrs**

Learning Resources	
Text Books	**Suggested Reading:** 1. Enhancing Employability : Connecting Campus with Corporate : M.S. Rao
Reference Books	2. Corporate Softskills : Sarvesh Gulati 3. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success: Gopalaswamy Ramesh, Mahadevan Ramesh
Web Sites / Links	4. *www.dupont.co.in/**soft-skill**-development*. 5. *www.wf**skills**college.org*. 6. *mass.educationalinnovation.org*.

Content Beyond the Syllabus:

   3. Leadership qualities

   4. Professional Skills

Subject Title	Advanced Data Structures Lab	Semester	III
Subject Code	17P3CAP05	Specialization	NA
Type	Core	L:T:P:C	0: 0 : 4 : 2

Objectives:

To give practical training in advanced Data structures.

LIST OF EXPERIMENTS	Number of Sessions
PROGRAMMING LIST: 10. To perform operations on Binary Search Trees 11. To perform operations on AVL Trees 12. To perform Graph representations : Adjacency Matrix & Adjacency List 13. Implementation of Graph Search Methods 14. To implement Binary search using Divide and Conquer method. 15. Implementation of Merge sort using Divide and Conquer method. 16. Implementation of Minimum cost spanning Trees 17. To implement Travelling salesman problem 18. To implement 8-Queens Problem	**60 Hrs**

Subject Title	.NET Programming Lab	Semester	III

Subject Code	17P3CAP06	Specialization	NA
Type	Core	L:T:P:C	0: 0 : 4 : 2

Objectives:

To explore the programming skills in .Net windows, console applications and ASP .Net.

LIST OF EXPERIMENTS	Number of Sessions
11. Write a program to accept any character from keyboard and display whether it is vowel or not. 12. Accept a character from console and check the case of the character. 13. Write a program to handle the exception 14. Create a DLL and use the function which has the DLL in another program 15. Develop a menu based .Net application to implement a text editor with cut, copy, paste, save and close operations. 16. Develop a .Net application to perform timer based quiz of 10 questions. 17. Develop a window based .Net application using Datagrid to display records. 18. Create an online bookstore that includes all validation controls available in .NET 19. Create a component that receives two numbers from the user through a Web Form, and based on the user's selection add or subtract the two numbers and returns the result to the Web Form. The result should be displayed in the Web Form using ASP.NET 20. Develop an online train ticket reservation system using .NET with the provision of insert, modify, update and delete operations.	**60 Hrs**

SEMESTER – IV

Subject Title	Advanced Java Programming	Semester	IV
Subject Code	17P4CA14	Specialization	NA
Type	Core	L:T:P:C	4: 0 : 0: 4

Objectives:

    This course gives an insight into advanced features of Java.

Unit	Syllabus Contents	Number of Sessions
I	**An Overview of Java:** Packages and Interfaces-Multithreaded Programming-The Applet Class- Event Handling-Introducing the AWT: Working with Windows, Graphics and Text-Using AWT Controls,Layout Manager and Menus.	**9 Hrs**
II	**An Overview of Java Beans**: The software component - The java beans development kit- Starting with BDK-Building Simple Beans-Your First Bean-Introspection Naming Conventions- Persistence-Customizers-Java beans API –A tour of SWING- RMI: An Overview of RMI-Building a Simple Client/Server Application-Using RMI in a Bean.	**12Hrs**
III	**Servlets**: The Life Cycle of a Servlet-A Simple Servlet- The Servlet API-The javx.servlet Package-Reading Servlet Parameters- The javax.servlet.http Package-Handling HTTP Requests and Responses-Using Cookies-Session Tracking.	**8 Hrs**
IV	**JSP** – Elements of JSP-JSP Syntax and Semantics-Expressions,Scriptlets, and Declarations-Request Dispatching-Session and Thread Management-JSP Tag Extensions: Introduction to Custom Tag-Developing your first Custom Tag.	**11 Hrs**
V	**JSP Applications:** –Database Access with JDBC-Overview of JDBC-JDBC Drivers-Connecting to a Database with DriverManager-The Statement Interface-Result Sets-Using Metadata-JSP and XML-JSP Testing and Debugging-Deploying Web Applications.	**10 Hrs**

Learning Resources	
Text Books	1. H. Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw

	Hill, New Delhi.(Unit I,UnitII,Unit III)
	2. Joseph O'Neil, 1998, Java Beans Programming from the ground Up, Tata McGraw Hill, New Delhi(Unit II)
	3. Phil Hanna ,JSP 2.0: The Complete Reference, Tata McGraw Hilll Edition,2003 New Delhi,(?Unit IV, Unit V).
Reference Books	1. James Koegh,2003, J2Me: The complete Reference, Tata McGraw Hill, Ne Delhi. 2. J.McGovern, R.Adatia,Y.Fain,2003,J2EE 1.4 Bible, Wiley-Dreamtech India Pvt.Ltd, New Delhi.
Web Sites / Links	1. *mytestrepository.googlecode.com* 2. https://dzone.com 3. https://archive.org 4. *www.amazon.in*

Content Beyond the Syllabus:

1. New technologies in JAVA

2. New tools for java developers

Subject Title	Open Source Technologies	Semester	IV
Subject Code	17P4CA15	Specialization	NA
Type	Core	L:T:P:C	4: 0 :4 : 4

Objectives: To learn about open source concepts and technologies with python and R programming and PHP

Unit	Syllabus Contents	Number of Sessions
I	The Web Publishing Foundation: The function of HTML in contemporary Web Publishing – Basic Structural Elements and their usage – Traditional text and formatting – Using tables for Organization and layouts –Creating forms with HTML – Frames and Frame sets – using Images with HTML	10
II	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	10
III	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	10
IV	Welcome to Python: What is python-origins-features-downloading and installing python-running python-python documentation-comparing python. Variables and assignment, numbers, strings Tuples – Lists - Dictionary	10
V	History and overview of R – Getting Started with R – R Nuts &Bolts – Getting data In and Out of R – Control statements - Functions of R	10

Learning Resources	
Text Books	1. Shelley Powers et.al. "Dynamic Web Publishing", Tech Media, 1998. 2. Lary Ullman , "PHP6 AND MySQL5 For Dynamic Web Sites" -, Pearson Education – 2008.Unit III - Chapter 1, 2, 4,5, Unit IV- Chapters 6,7,8 Unit V, Chapters 11, 12, 13. 3. Wesley J Chun, "Core Python Programming", Pearson, 2nd Edition,2012 4. Roger D. Peng, "R Programming for data science , Lean Publishing, 2015. 5. Colin Gillespie and Robin Lovelace "Efficient R Programming- A Practical Guide to Smarter Programming", O'reilly, 2017
Reference Books	1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Black Book **Author** Kogent Learning Solutions Inc. 2. Paul Barry, "Head First Python", 1st Edition, O'Reilly Media, 2011 3. Mark Lutz, "Learning Python", 5th Edition, O'Reilly Media, 2013 4. Thomas Rahlf, **Data Visualisation with R – 100 Examples**, Cham: Springer 2017, XVI, 387 p., four-color print. 19 b/w illustrations, 162 illustrations in colour. eBook ISBN: 978-3-319-49751-8, Hardcover ISBN: 978-3-319-49750-1.
Web Sites / Links	1. www.diveintopython3.net 2. www.webdesignref.com/default_main.htm 3. www.sophia.org/tutorials/internet-web-technologies 4. www.cran.r-project.org 5. www.tutorialpoint.com

Content Beyond the Syllabus:
1. Operating system projects
2. Operating system installation

Subject Title	Advanced Software	Semester	IV

	Engineering		
Subject Code	**17P4CA16**	**Specialization**	**NA**
Type	**Core**	**L:T:P:C**	**4 : 0 : 0 : 4**

Objectives: To enrich the students by learn about Software Development Phases, object oriented analysis, UML concepts and testing strategies

Unit	Syllabus Contents	Number of Sessions
I	**Introduction to Software Engineering** – The Evolving Role of Software – Software – Software Myths – The Software Process: – A Generic View of Process – Software Engineering a layered technology – A Process Framework – Process Models: -Prescriptive Models – The Waterfall Models- Incremental Process Models, Evolutionary Process ModelsThe Unified Process.	10
II	**Requirements Engineering**: - Requirements Engineering Tasks – Initiating the Requirements Engineering Process – Eliciting Requirements – Building the Analysis Model – Negotiating and Validating Requirements- Building the Analysis Model:- Requirements Analysis – Analysis Modeling Approaches.	10
III	An overview of (OOAD) object oriented analysis – Object basics Introduction – Survey – Rumbugh, Booch, Jacobson methods – Patterns – Creational – Abstract Factory – Factory Method – Behavioral – Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams	10
IV	Identifying Use case – Business object analysis – Usecase driven object oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods –Super-sub class – A part of relationships Identifying attributes and methods	10
V	Quality assurance – Testing strategies – Test cases – Automated Testing Tools – Case Study -Cryptanalysis – Health Care Systems- Inventory Control System - Rational Rose Suite	10

Learning Resources

Text Books	1. Roger S. Pressman, "Software Engineering a Practioner"s Approach", Sixth Edition, McGraw-Hill Higher Education, 2006. 2. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008
Reference Books	1. Ian Somerville, "Software Engineering", Seventh Edition, Pearson Education, 2005. 2. Richard Fairly, "Software Engineering Concepts", TMGH, 2004. 3. Rajib Mall, "Fundamentals of Software Engineering", PHI, Second Edition, 2000. 4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mndrioli, "Fundamentals of Software Engineering ", Second Edition, PHI/Pearson Education Asia, 2000. 5. Craig Larman, Applying UML and Patterns, 2nd Edition, Pearson, 2002 6. Brahma Dathan, Sarnath Ramnath, "Object-Oriented Analysis, Design and Implementation",Universities Press, 2010 7. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide",Addison Wesley Long man, 1999
Web Sites / Links	1. *www.cs.umass.edu* 2. *https://books.google.co.in* 3. *www.win.tue.nl* 4. *www.rspa.com* 5. *www.ictts.org*

Content Beyond the Syllabus:

1. 1. Uses of software engineering in different fields
2. Testing tools and terminologies

Subject Title	Data mining and Warehousing	Semester	IV
Subject Code	17P4CA17	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

    To introduce the major concepts of Data Mining & Warehousing and also know about the basic data mining functionalities and different analysis methods

Unit	Syllabus Contents	Number of Sessions
I	**Introduction** – Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse – A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining.	10
II	**Data pre-processing** – Data cleaning – Data Integration and Transformation – Data Reduction – Discredidation and concept hierarchy generation – Data mining primitives – Data mining Task	10
III	**Association Rule Mining** – Mining single dimensional Boolean association rules from transactional databases –. Classification and prediction – Issues regarding classification and prediction – Bayesian classification- Classification by Back propagation – classification based on concepts from association rule mining	10
IV	**Cluster Analysis** – A categorization of Major clustering methods - Partitioning methods- Hierarchical methods – Grid based methods -Model based clustering methods – Density – based methods	10
V	**Applications and Trends in Data Mining** – Data mining system products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining-Mining Spatial Databases – Mining Time-series and sequence data – Mining the World wide web.	10

	Learning Resources
Text Books	1. Jaiwei Han, Michelien Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers an Imprint of Elsevier, 2001.
Reference Books	1. Arun K.Pujari, "Data Mining Techniques", Universities Press (India) Limited, 2001. 2. George M. Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Printice Hall, First Edition, 2002. 3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson, 2008. 4. Soman K. P, Shyam Diwakar, V. Ajay, Data Mining, Printice Hall, 2008.
Web Sites / Links	1. www.Solver.com/XLminer 2. www.knowledge-management-tools.net/**data-warehousing**.html

Content Beyond the Syllabus:
1. Data mining and warehousing in healthcare
2. Data mining tools

Subject Title	**Advanced Java Programming Lab**	Semester	IV
Subject Code	**17P4CAP07**	**Specialization**	**NA**
Type	**Core**	**L:T:P:C**	**0: 0 : 4 : 2**

Objectives:

    To give practical training in advanced java programming.

LIST OF EXPERIMENTS	Number of Sessions
PROGRAMMING LIST: 1. HTML to Servlet Applications 2. Applet to Servlet Communication 3. Designing online applications with JSP 4. Creating JSP program using JavaBeans 5. Working with Enterprise JavaBeans 6. Accessing Database using Java Database Connectivity. 7. Updating database using JDBC. 8. Creating Web services with RMI. 9. Building web applications	**60 Hrs**

Subject Title	Open Source Technologies Lab	Semester	V
Subject Code	17P4CAP08	Specialization	NA
Type	Core	L:T:P:C	0 : 0 : 5 : 2

Objectives:

To have practical understanding in web technologies.

LIST OF EXPERIMENTS	NUMBER OF SESSION
1. Web Page Creation using HTML tags 2. Students Feedbacks System. 3. Job Registrations. 4. Library Management System. 5. Banking Transaction System. 6. Simple Shopping Application. 7. Webpage Kit Counters using Session. 8. Airline Reservation System.	60

Subject Title	Multimedia Lab	Semester	IV
Subject Code	17P4CAP09	Specialization	NA
Type	JOB ORIENTED LAB	L:T:P:C	0 : 0 :2 : 1

Objectives:

To give practical training in **web designing software's (Flash, Photoshop, Coreldraw)**

LIST OF EXPERIMENTS	Number of Sessions
PROGRAMMING LIST: 1. Create an animation using shape Tween effect in flash 2. Create an animation using motion Tween in flash 3. Creating a Layer mask effect in flash 4. Text effect using Photoshop. 5. Filter effects for image in Photoshop. 6. Wallpaper using pattern marker. 7. Digital drawing for a image 8. Edit a image using Clone stamp tool in Photoshop 9. Designing Webpage layout for a website. 10. Merging images in Photoshop 11. Image editing and color options in Photoshop 12. Create a logo using coreldraw with various effects.	**30 Hrs**

SEMESTER – V

Subject Title	ADVANCED NETWORKS	Semester	V
Subject Code	17P5CA18	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

    The objective of this course is to introduce students to a set of advanced topics in networking and lead them to the understanding of the networking research with a target of accomplishing a research paper of their own.

Unit	Syllabus Contents	Number of Sessions
I	**Introduction: Networks:** Standards and Administration – Protocol Layering – OSI model –TCP/IP protocol suite. Transmission Media – Guided Media – Unguided Media. **Data Link Layer:** Introduction – Link Layer Addressing– Error Detection and Correction – Introduction – Types of Errors – Redundancy – Detection Vs Correction – Coding. DLC services – Framing – Flow Control and Error control – Connectionless and Connection Oriented	10
II	**Network Layer:** Network Layer Services – Packet Switching – Network Layer Performance– Internet Protocol (IP) – Datagram Format – Fragmentation – Options – Security of IPv4 Datagrams– Unicast Routing : Introduction – Routing Algorithms.	10
III	**Transport and Application Layer**: Introduction to Transport Layer - Transport-Layer Protocols - Introduction to Application Layer - Standard Client-Server Protocols	10
IV	**High Speed Networks and Congestion Control:** Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM Logical Connections, ATM Cells – ATM Service Categories – AAL – High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs – Queuing Analysis- Queuing Models – Single Server Queues	10
V	**TCP and ATM Congestion Control:** TCP Flow control – TCP Congestion Control – Retransmission Timer Management – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work – Traffic Control – ABR traffic Management –	10

	Learning Resources
Text Books	1. Behrouz A. Forouzan, "Data Communication and Networking", 5th Edition, Tata McGraw Hill, 2013. 2. Stallings, William., "High Speed Networks and Internets: Performance and QoS", Second Edition, Pearson Education, 2002
Reference Books	1. Andrew S. Tanenbaum and David J. Wetherall, "Computer Networks", 5th Edition, Pearson Education, 2011 2. Larry L. Peterson and Peter S. Davie, "Computer Networks", 5th Edition, Elsevier, 2012. 3. Tanenbaum Andrew S., "Computer Networks", 5th Edition, Prentice Hall of India, New Delhi, 2013.
Web Sites / Links	1. *https://docs.docker.com* 2. *www.microchip.com* 3. *www.sanfoundry.com* 4. *www.oxfordreference.com* 5. *www.nist.gov*

Content Beyond the Syllabus:
1. Advanced networks group
2. Advanced network technology

Subject Title	Complier Design	Semester	V
Subject Code	17P5CA19	Specialization	NA
Type	Core	L:T:P:C	4: 0 : 0 : 4

Objectives: To introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers

Unit	Syllabus Contents	Number of Sessions
I	**Introduction:** What is a compiler?-The phases of a compiler- Interpreters-Why learn about compilers? - Lexical Analysis :Introduction - Regular expressions- Shorthands - Nondeterministic finite automata -Converting a regular expression to an NFA -Optimisations - Deterministic finite automata - Converting an NFA to a DFA Solving set equations - The subset construction - Size versus speed - Minimisation of DFAs .	10
II	**Lex**:Lexers and lexer generators - Properties of regular languages - Syntax Analysis : Introduction- Context-free grammars - How to write context free grammars- Derivation -Syntax trees and ambiguity - Operator precedence - Rewriting ambiguous expression grammars- Other sources of ambiguity - Syntax analysis - Predictive parsing - Nullable and FIRST - Predictive parsing revisited-A larger example .	10
III	**Parsing:**LL(1) parsing - Rewriting a grammar for LL(1) parsing -SLR parsing-Constructing SLR parse tables-Using precedence rules in LR parse tables- Using LR-parser generators-s -Properties of context-free languages-Scopes and Symbol Tables : Introduction-Symbol tables	10
IV	**Interpretation**:Introduction- The structure of an interpreter- A small example language - An interpreter for the example language - Type Checking:Introduction - The design space of types –Attributes- Environments for type checking- Type checking expressions- Type checking of function declarations- Type checking a program - Advanced type checking	10
V	**Intermediate-Code Generation** : Introduction- Choosing an intermediate language -The intermediate language- Syntax-directed translation - Generating code from expressions- Translating statements - Logical operators - Advanced control statements -Translating structured data -Translating declarations - Machine-Code Generation : Introduction-Conditional jumps - Constants - Exploiting complex instructions – Optimizations	10

Learning Resources	
Text Books	1. Basics of Compiler Design by Torben Ægidius Mogensen First published 2000.This edition: August 20, 2010, 2. Book homepage:http://www.diku.dk/_torbenm/Basics
Reference Books	1. Modern Compiler Design ,2nd edition,by Dick Grune[a], Kees van Reeuwijk[a], Henri E. Bal[a], Ceriel J.H. Jacobs[a], and Koen Langendoen[b] [a]Vrije Universiteit, 2. Amsterdam Technische Universiteit, Delft April 10, 2010
Web Sites / Links	1. https://en.wikipedia.org 2. https://books.google.co.in 3. www.google.com 4. *dinosaur.compilertools.net* 5. www.cse.iitm.ac.in 6. *www.citemaster.net*

Content Beyond the Syllabus:

    1.Register Allocation

    2. Stack Allocation & Memory Management

Subject Title	Big Data Analysis	Semester	V
Subject Code	17P5CA20	Specialization	NA
Type	Core	L:T:P:C	4 : 0 : 0 : 4

Objectives:

- To provide practical foundation level training that enables immediate and effective participation in big data
  To provide grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop

Unit	Syllabus Contents	Number of Sessions
I	**INTRODUCTION TO BIG DATA** Introduction – distributed file system – Big Data and its importance,Four Vs, Drivers for Big data, Big data analytics, Big dataapplications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.	10
II	**INTRODUCTION HADOP** Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.	10
III	**HADOOPP ARCHITECTURE:** Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance	10
IV	**HADOOP ECOSYSTEM AND YARN:** Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features- NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.	10
V	**HIVE AND HIVEQL, HB :** Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts-Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.	10

Learning Resources	
Text Books	1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015. 2. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012 3. Tom White, "HADOOP: The definitive Guide" , O Reilly 2012
Reference Books	1. Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013 2. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014. 3. Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013
Web Sites / Links	1. http://www.bigdatauniversity.com

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

Subject Title	Case Tools Lab	Semester	V
Subject Code	17P5CAP10	Specialization	NA
Type	Core	L:T:P:C	0 : 0 : 5 : 2

Objectives:

To have practical understanding of software development using case tools

LIST OF EXPERIMENTS	NUMBER OF SESSION
Diagrams using UML for a system whose description is given below. UML diagrams to be developed : 1. Use Case Diagram. 2. Class Diagram. 3. Sequence Diagram. 4. Collaboration Diagram. 5. State Diagram 6. Activity Diagram. 7. Component Diagram 8. Deployment Diagram. A possible set of applications may be the following: a. Library System b. Student Marks Analyzing System. c. ATM system, d. Inventory System.	**60**

ELECTIVE – I

Subject Title	Management Information Systems	Semester	III
Subject Code	17P3CAE01	Specialization	NA
Type	Elective-I	L:T:P:C	4 : 0 : 0 : 4

Objectives :

The main objective is to provide the fundamental concepts of information system and the process of management.

Unit	Syllabus Contents	Number of Sessions
I	Foundation concepts of information systems: Fundamental roles of information – Trends in Information systems – The role of e-Business in business – Types of information systems - System Concept – Components of Information system – Information System resources – Information system activities - Meaning and Definition of MIS - MIS design, Development.	12
II	Fundamental of Strategic IT – competitive strategy concepts – Strategic uses of Information Technology – Role of information technology – Building Knowledge creating company – Knowledge Management systems - Computer Hardware Types of Computer system – Mainframe computer systems & Computer peripherals – Computer software – system software: OS – Application software –spread sheet – graphic packages	8
III	Telecommunications and Networks: Trends in Telecommunication– Telecommunication Network Model – Types of telecommunication networks – Telecommunication Media – Processors – Network Architectures and protocols.	10
IV	e-Business systems - introduction - IT in business: Functional Business Systems - Accounting, Finance, Manufacturing and Systems, Marketing - Human resource Information System – ERP – benefits and Challenges – cost of ERP – Trends in ERP. e-commerce, Scope, technologies	10
V	Strategic and managerial implication of Information system – Managing information system resources . Decision support system: Executive Information System – Artificial Information system –Expert Systems. Security, Ethical & society – ethical responsibility of Business professionals.	10

Learning Resources	
Text Books	1. Jame O'Brien, "Management Information System", Tata McGraw-Hill Publishing Company Ltd 2007(Sixth Reprint).
Reference Books	1. Woman S Jawadekar," Management Information System ", The McGraw-Hill Companies. Eight reprint 2008 2. Kenneth C.Laudon & Jane P.Laudon ," Management Information System ",Prentice Hall of India(P)Ltd 2007. 3. D.P.Goyal, "Management Information System ", Macmillan Publishers India Limited, 2010.
Web Sites / Links	1. www.wifinotes.com 2. www.ctparts.com 3. www.indianmba.com 4. www.techopedia.com

Content Beyond the Syllabus:

5. 1. Management information system case study

6. MIS in banking sector

Subject Title	Graphics and Multimedia	Semester	III
Subject Code	17P3CAE02	Specialization	NA
Type	**Elective-I**	**L:T:P:C**	**4 : 0 : 0 : 4**

Objectives:

To learn about graphics and multimedia by practicing with drawing algorithms, animation and compression techniques.

Unit	Syllabus Contents	Number of Sessions
I	**Basic Concepts:** Introduction-Origins of Computer Graphics-Working of Interactive Graphics display-Video display devices- Raster Scan System-Random Scan System-Input Devices- Hard Copy devices – Graphics Software. Output Primitives: Points and Lines-Line-Drawing Algorithms: Circle Generating Algorithm-Ellipse Generating Algorithms-Filled Area Primitives.	10
II	**Two Dimensional Geometric Transformations**: Basic Transformation-Matrix Representation-Composite Transformation-Other transformation. Two-Dimensional Clipping and Viewing. Three-Dimensional Concepts - Three-Dimensional Object Representations – Three- Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation.	10
III	**Introduction to Multimedia –** Multimedia tools: Hardware components of multimedia system-multimedia PC, The playback system, the development system. Multimedia Elements: Working with text, text intensive titles-software for creating and editing text. Working with graphics: Software for creating and editing graphics-Features of graphics programs-Sources of graphics images.	10
IV	**Multimedia elements:** Sound, animation and video. Sound: Sampling, MIDI, Animation, Virtual Reality, Video. Multimedia authoring programs: MM Presentation-Applications-How authorizing system works in programming languages. Developing Multimedia: The steps in developing interactive multimedia - the planning phase, the creating phase testing phase. Design for multimedia: Basic design principles, Designing for interactivity – Guidelines for interactive design.	10
V	**Managing Multimedia projects:** Management issues of multimedia developments, the management process and multimedia projects producing multimedia titles: Compact disk production process, distributing multimedia titles on CD ROM at online, Kisok based multimedia. Multimedia issues and the future of multimedia: The internet and WWW-Design consideration for	10

	multimedia on internet – issues and trends in multimedia – Copyright issues, censorship issues and trends in multimedia industry.	

	Learning Resources	
Text Books	1. Donald Hearn and M.Pauline Baker, "*Computer Graphics C Version*", Pearson Education, . (UNIT I & UNIT 2). 2. James E. Shuman "Multimedia in Action".Indian Edition 1998. (UNIT 3 to 5)(Unit 3: Chapter 1,2 & 3, Unit 4: Chapter 4,5 & 6, Unit 5: Chapter 8,9,10,11 & 12).	
Reference Books	1. Judith Jeffcoate, "*Multimedia in practice technology and Applications*", PHI . 2. Foley, Vandam, Feiner, Huges, "*Computer Graphics: Principles & Practice*", Pearson Education.	
Web Sites / Links	1. https://www.graphics.rwth-aachen.de 2. *multimedia.eserver.org* 3. https://books.google.co 4. https://msdn.microsoft.com	

Content Beyond the Syllabus:

1. 1. 3D Display methods, Depth Buffer method
2. Distributed Multimedia Systems

Subject Title	Mobile Computing	Semester	III
Subject Code	17P3CAE03	Specialization	NA
Type	**Elective-I**	**L:T:P:C**	**4 : 0 : 0 : 4**

Objectives:

    To learn the latest techniques in wireless communication, Mobile IP network layer, Mobile transport layer, languages for mobile application and mobile operating systems.

Unit	Syllabus Contents	Number of Sessions
I	**Introduction to Mobile computing:** Mobile communication – Mobile computing – Mobile computing architecture – Mobile devices. **Mobile computing technology:** GSM, SMS, GPRS, CDMA and 3G.	8
II	**Wireless LAN:** Introduction – Wireless LAN advantages – IEEE 802.11 standards – Wireless LAN architecture – Mobility in wireless LAN – Deploying wireless LAN – Mobile Ad Hoh networks and sensor networks – Wireless LAN security – WIFI versus 3G.	12
III	**Mobile IP Network Layer:** IP and Mobile IP network layers – Packet delivery and Handover management – Location management – Registration – Tunneling and Encapsulation – Route optimization – Dynamic Host Configuration Protocol.	10
IV	**Mobile Transport Layer:** Conventional TCP/IP Transport layer protocols – Indirect TCP – Snooping TCP Mobile TCP – Other methods of TCP – Layer transmission for mobile networks – TCP over 2.5G/3G Mobile networks.	12
V	**Mobile application languages and Operating Systems:** J2ME – Palm OS – Windows CE –Symbian OS – Linux for Mobile devices.	8

	Learning Resources
Text Books	1. Computer Networks: A Systems Approach, 4th edition, by Larry L. Peterson, Bruce S. Davie,Publisher Elsevier/Morgan Kaufmann. 2. MPLS: Next Steps, by Bruce S. Davie, Adrian Farrel, Publisher: Morgan Kaufmann.
Reference Books	1. Metro Ethernet, by Sam Halabi, Publisher: Cisco Press 2. Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer 3. Computer Networks, by A. S. Tanenbaum, Publisher: Prentice Hall; 4. Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer 5. Mesh Based Survivable Networks, by Wayne Grover, Publisher: Prentice Hall.
Web Sites / Links	1. *www.doc.ic.ac.uk* 2. *www.humanergology.com* 3. *www.ncbi.nlm.nih.gov* 4. *www.ijarcsse.com* 5. *https://www.interaction-design.org* 6. *www.oxfordreference.com*

Content Beyond the Syllabus:
1. Mobile Computing Applications
2. Mobile Computing Software tools

Subject Title	Advanced Operating System	Semester	III
Subject Code	17P3CAE04	Specialization	NA
Type	Elective-I	L:T:P:C	4 : 0 : 0 : 4

Objectives: To provide the overview of computer system and the operating system, the concepts of process management, memory management, storage management, protection and security issues, and distributed systems. To gain knowledge on Distributed operating system

Unit	Syllabus Contents	Number of Sessions
I	**An Overview of Operating System and Its Structures: Introduction** : Definition of OS- Operating System Structure-System Components-System Calls- Process- Concepts-Process Scheduling-Scheduling Concepts-Criteria-Scheduling Algorithms	10
II	**Process Synchronization and Dead Locks:** Process Synchronization – Background, Critical Section-Synchronization Hardware-Semaphores-Problems of Synchronization-Critical Regions-Monitors-Deadlocks-System model, Characterization-Methods of Handling Deadlocks-Deadlock Prevention-Avoidance-Detection-Deadlock Recovery.	10
III	**Memory Management :** Background , Swapping ,Contiguous-Non Contiguous Storage Allocation-Paging - Segmentation – Segmentation with paging - Virtual Memory-Basic Concepts- Page Replacement Methods-Allocation of frames-Thrashing.	10
IV	**I/O And File Systems:** File Concepts-File System Structure-Access Methods-Directory Structure-Protection-Directory Implementation-Distributed systems – Goals, Software concepts – Network Operating systems- True distributed systems – Multiprocessor, Time sharing system,-Distributed File system design- system structure	10
V	**Distributed Operating Systems** Issues in Distributed Operating System – Architecture. **Linux System**: Design Principles -Kernel Modules -Process Management Scheduling -Memory Management -Input-Output Management -File System – Inter process Communication. iOS and Android: Architecture and SDK Framework -Media Layer -Services Layer.	10

	Learning Resources
Text Books	1. Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, (Asia) Pvt Ltd , 2005. 2. Andrew and Tanenbaum , Distributed Operating System, 4th Edition, Pearsons Ltd, 2002 3. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd edition, O'Reilly, 2005.
Reference Books	1. Milankovic M., Operating System Concepts and Design, 2nd Edition, McGraw Hill, 1992 2. P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2004 3. H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson Education, 2002 4. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems –Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001 5. Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2006. 6. Neil Smyth, "iPhone iOS 4 Development Essentials –Xcode", Fourth Edition, Payload media, 2011.
Web Sites / Links	1. https://technet.microsoft.com 2. https://en.wikipedia.org 3. www.tutorialspoint.com 4. https://books.google.co.in 5. *www.webopedia.com* 6. *www.refdesk.com*

Content Beyond the Syllabus:

1. Operating system projects
2. Operating system installation

ELECTIVE – II

Subject Title	Distributed Computing	Semester	IV
Subject Code	17P4CAE05	Specialization	NA
Type	**Elective-II**	L:T:P:C	**4 : 0 : 0 : 4**

Objectives:

This subject brings the view of distributed computing with applications.

Unit	Syllabus Contents	Number of Sessions
I	Characterization of Distributed Systems: Introduction- Examples of Distributed Systems- Resource sharing and the Wed- System models: Architectural models-Fundamental Models, Inter process Communication: The API for the Internet Protocols, External data representation and marshalling, Client Server communication, Group Communication.	**10**
II	Distributed objects and Remote Invocation: Communication between distributed objects, Remote Procedure call, Events and notifications. Operating System Support – The operating system layer-Protection-Processes and threads-Communication and invoacation-Operating system architecture.	**10**
III	Distributed File Systems: File service architecture-Sun network file system- The Andrew file system. Name services: Name services and DNS, Directory services, Time and Global states: clocks, events and process states synchronizing physical clocks-Logical time and logical clocks-Global states.	**10**
IV	Coordination and Agreement: Distributed mutual exclusion- Election-Multicast communication. Transaction and concurrency control: Transaction, Nested transaction, Locks, Optimistic concurrency control, Timestamp ordering.	**10**
V	Distributed Transactions: Flat and nested distributed transaction, Atomic commits protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.	**10**

	Learning Resources
Text Books	1. George Coulouris, Jean Dollimare,Tim Kindberg,Distributed Systems Concepts and Design, AWL,4th Edition, 2005 2. Cloud computing, (A Practical Approach)- Anthony T.Velte, Toby J.Velte, Tata McGraw-Hill Edition 2010.
Reference Books	1. Pradeep K. Sinha, Distributed Operating Systems: Concepts and Design Wiley-IEEE Press. 2. Andrew S. Tanenbaum, Maartenvan Steen, Distributed Systems-Principles and Paradigms, Pearson Education, 2002.
Web Sites / Links	1. https://en.wikipedia.org 2. www.elsevier.com 3. https://books.google.co.in 4. *dl.acm.org/**citation**.* 5. www.encyclopedia.com 6. www.scirp.org

Content Beyond the Syllabus:
1. Distributed computing environment
2. DC in web services

Subject Title	Artificial Intelligence and Expert Systems	Semester	IV
Subject Code	17P4CAE06	Specialization	NA
Type	**Elective-II**	L:T:P:C	**4 : 0 : 0 : 4**

Objectives:

Understand the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence and role of expert systems.

Unit	Syllabus Contents	Number of Sessions
I	Problems and Search: The AI problems – The underlying Assumption – AI Technique - The level of the Model – Criteria for Success – Problems, Problem Space, and Search: Defining the problem as a state space search – Production systems – problem characteristics – Production system characteristics – Issues in the design of Search Programmes.	**10**
II	Heuristic Search Techniques: Generate and Test – Hill Climbing – Best First Search – Problem Reduction – constraint Satisfaction – Means ends Analysis.	**10**
III	Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame problem.	**10**
IV	Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and ISA Relationships –Computable Functions and Predicates - Resolution Knowledge Representation using Rules: Procedural versus Declarative Knowledge –Logic programming – Forward versus Backward Reasoning – Weak slot –and- Filler Structures : semantic Nets – Frames – Strong Slot- and –Filler Structures : Conceptual Dependency – Scripts – CYC.	**10**
V	Expert systems: Introduction to Expert systems -Expert system Tools – Building an Expert System – Difficulties with Expert System development Pedagogy.	**10**

Learning Resources	
Text Books	1. Elaine Rich and Kevin Knight (2009). *Artificial Intelligence*, 3/e; New Delhi: Tata McGraw-Hill. 2. Donald A. Waterman (2003). *A Guide to Expert Systems*; New Delhi: Tech knowledge Series in Knowledge Engineering
Reference Books	1. Charnaik, E., C.K. Reiesbeck, and D.V. McDermett (2000). *Artificial Intelligence Programming*; New Jersey: Lawrence Erlbaum Associates. 2. Nils J. Nilsson (2001). *Principles of Artificial* Intelligence; New Delhi: Narosa Publishing .
Web Sites / Links	1. *https://en.wikipedia.org* 2. *www.sanfoundry.com* 3. *www.webopedia.com* 4. *www.cs.grinnell.edu* 5. *www.sciencedirect.com*

Content Beyond the Syllabus:
1. Scope of AI & expert systems
2. AI and expert system in Steel Industry

Subject Title	Mobile App Development	Semester	IV
Subject Code	17P4CAE07	Specialization	NA
Type	Elective-II	L:T:P:C	4 : 0 : 0 : 4

Objectives: To know system requirements for mobile applications, design, frameworks, Generate mobile application design.

Unit	Syllabus Contents	Number of Sessions
I	**Introduction:** Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications	10
II	**Basic Design:** Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – user interfaces for mobile applications –performance, usability, security, availability and modifiability.	10
III	**Advanced Design:** Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications	10
IV	**Android:** Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – GPS and Wifi– Integration with social media applications.	10
V	**IOS :** Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.	10

Learning Resources	
Text Books	1. Jeff McWherter and Scott Gowell, "Professional Mobile Application development", Wrox,2012 2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech,2012. 3. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
Reference Books	1. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 2. Development: Exploring the iOS SDK", Apress, 2013.
Web Sites / Links	http://developer.android.com/develop/index.html

Content Beyond the Syllabus:

1. Interaction with server side applications
2. Touch events and gestures

Subject Title	E-commerce	Semester	IV
Subject Code	17P4CAE08	Specialization	NA
Type	Elective II	L:T:P:C	4 : 0 :0: 4

Objectives:

     To learn about current marketing trend using E-commerce techniques in Internet and Extranet and payment systems.

Unit	Syllabus Contents	Number of Sessions
I	**What is E-Commerce?** – Advantages and Limitations of ECommerce – The Role of Strategy in E-Commerce – Value Chains in E-Commerce – Integrating E-Commerce – Managerial Implications – The Internet and the World Wide Web: The Internet Today – In the Beginning – Unique Benefits of the internet – Searching Online - Bulletin Board Systems (BBSs) and Pay Services –Some Web Fundamentals – The Language of the Internet – Managerial Implications. .	12Hrs
II	**Launching a Business on the Internet:** The Lifecycle Approach – The Business Planning and Strategizing Phase – Hardware, software, Security, and the Setup Phase – The Design Phase – The Marketing Phase – The Fulfillment Phase – The Maintenance and Enhancement Phase – Designing Web Sites: What does a Web Site Do – The Lifecycle of Site Building – How to Build a Web Site – Web Navigation Design – Design Criteria – Hiring a Web Designer – Website Evaluation and Usability Testing: Anatomy of a Site – What"s the Big Fuss Over Cookies –Makes a Web Site Usable – Web Site Content and Traffic Management.	10 Hrs
III	**Payment Systems:** From Barter to Money – Requirements for Internet-based Payments – Electronic Payment Media – Issues and Implications – E-Security: Security in Cyberspace – Designing for Security – how Much risk Can You Afford – The Virus: Computer Enemy Number One – Security Protection and Recovery – How to Secure Your System.	8Hrs
IV	**Marketing on the Internet:** The Pros and Cons of Online Shopping – Internet Marketing Techniques – The E-Cycle of Internet Marketing – Marketing Your Presence – Attracting Customers to Your Site – Tracking Customers – Customer Service – managing Implications – Web-Based Business-to-Business E-Commerce: B2B E-Commerce – B2B Models – B2B Tools-EDI – Beyond B2B: A2Z – Management Implications.	10 Hrs
V	**Intranets and Extranets:** Intranets: The Basics – The Technical Infrastructure – Planning an Intranet – E-Mail and the Intranet – Extranets – Management Implications – Legal and Ethical Issues, Legal Issues - Ethical Issues- Management Implications- CASE Studies.	10 Hrs

	Learning Resources	
Text Books	1. Elias M.Awad, "Electronic Commerce, PHI, 2006. (Chapters:1,2,3,5,6,8,9,11,12,13, 14,15)	
Reference Books	1. Kamalesh K.Bajaj, Debjani Neg, "E-Commerce the Cutting Edge of Business", TMH, 2000. 2. S. Jaiswal, "Doing Business on the Internet E-Commerce", Galgotia, 2002.	
Web Sites / Links	1. *www.referenceforbusiness.com › Encyclopedia of Management › De-Ele* 2. *www.referenceforbusiness.com › ... › Eco-Ent* 3. *cyber.law.harvard.edu/olds/ecommerce/library.html* 4. *https://www.humanrights.gov.au/working-paper-e-commerce-reference-...*	

Content Beyond the Syllabus:

1. E-commerce business models
2. E-commerce applications

ELECTIVE – III

Subject Title	XML and Web Services	Semester	V
Subject Code	17P5CAE09	Specialization	NA
Type	Elective-III	L:T:P:C	4 : 0 : 0 : 4

Objectives:

    To learn about markup languages and web service architecture.

Unit	Syllabus Contents	Number of Sessions
I	Xml Technology Family XML – benefits – Advantages of XML over HTML – EDI – Databases – XML based standards – DTD – XML Schemas – X – Files – XML processing – DOM – SAX – presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH – XQ	10
II	Architecting Web Services Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web service.	8
III	Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime. web Services Building Block Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services –	12
IV	WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad – Hoc Discovery – Securing web services.	10
V	Implementing Xml In E – Business B2B – B2C Applications – Different types of B2B interaction – Components of e – business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – web services for mobile devices.	10

	Learning Resources
Text Books	1. Ron Schmelzer et al, "XML and Web Services", Pearson Education, 2002. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
Reference Books	1. Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002. 2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education,2003.Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004. 3. Russ Basiura and Mike Batongbacal, "Professional ASP .NET Web Services", Apress, 2003
Web Sites / Links	1. stackoverflow.com 2. www.webreference.com/

Content Beyond the Syllabus:
1. XML and web services in android
2. Used of XML in web technology

Subject Title	Soft Computing	Semester	V
Subject Code	17P5CAE10	Specialization	NA
Type	Elective-III	L:T:P:C	4 : 0 : 0 : 4

Objectives:

To deal with the design of hybrid intelligent systems which, in contrast to classical hard computing techniques, are tolerant to imprecision, uncertainty, partial truth, and approximation.

Unit	Syllabus Contents	Number of Sessions
I	**Fundamentals of Neural Networks:** Basic Concepts of Neural Network-Model of an Artificial Neuron-Neural Network Architectures-Characteristics of Neural Networks-Learning Methods-Taxonomy of Neural Network Architectures-History of Neural Network Research-Early Neural Network Architectures-some applications domain.	10
II	**Backpropagation Networks:** Architecture of Backpropagation Network-Backpropagation Learning –illustrations-applications-Effect of Tuning Parameters of the Backpropagation Neural Network-Selection of various parameters in Backpropagation rk-Variations of Standard Backpropagation algorithms.	10
III	**Adaptive Resonance Theory (ART) :** Introduction-classical ART networks-simplified ART architecture- ART1- Architecture of ART1-special features of ART1-ART1 algorithm.ART2- Architecture of ART2- ART2 algorithm -.Applications.	10
IV	**Fuzzy logic:** Fuzzy Set Theory- Fuzzy Sets-Fuzzy Relations. Fuzzy Systems: Fuzzy Logic-Fuzzy Rule based system - Defuzzification Methods-Applications. Fuzzy Backpropagation Networks: LR-Type Fuzzy Numbers-Fuzzy Neuron-Fuzzy Backpropagation Architecture**.**	10
V	**Genetic algorithms:-**Fundaments of Genetic algorithms-Basic	10

	concepts-creation of Offsprings-encoding-reproduction. Genetic modeling: Cross Over-Inversion and Deletion-Mutation Operator-Bit Wise Operators – PSO: Particle Swam Optimization.	

	Learning Resources
Text Books	1. Rajasekaran. S and Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, New Delhi-2005. (Unit I-Chapters: 2.1, 2.3-2.10, Unit-II-3.1-3.7, Unit-III-5.1-5.4, Unit-IV-6.3, 6.5, 7.3-7.6, 12.1-12.3,Unit-V-8.2,8.3,8.5,8.7,9.2,9.3,9.4,9,5)
Reference Books	1. Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009. 2. Sivanandam. S. N and Deepa S. N, Principles of Soft Computing, Wiley India, 2008.
Web Sites / Links	1. *www.myreaders.info* 2. *www.springer.com* 3. *www.sciencedirect.com* 4. *www.elsevier.com* 5. *www.cs.berkeley.edu*

Content Beyond the Syllabus:

1. Applications of soft computing
2. Soft computing Tools

Subject Title	Middleware Technologies	Semester	V
Subject Code	17P5CAE11	Specialization	NA
Type	Elective-III	L:T:P:C	4 : 0 : 0 : 4

Objectives:

The objective of this technology is to learn about advanced features of middleware.

Unit	Syllabus Contents	Number of Sessions
I	Introduction to client server computing: Evolution of corporate computing models from centralized to distributed computing, client server models. Benefits of client server computing, pitfalls of client server programming	10
II	CORBA with Java: Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java.	10
III	Introducing C# and the .NET Platform; Understanding .NET Assemblies; Object –Oriented Programming with C#; Callback Interfaces, Delegates, and Events.	10
IV	Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.	10
V	Core CORBA / Java: Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multi count.	10

	Learning Resources
Text Books	1. Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition , 2010. 2. Java programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons, 2003.
Reference Books	1. Qusay H. Mahmoud, "Middleware for Communications", John Wiley and Sons,2004. 2. Gerald Brose, Andreas Vogel, Keith Duddy, "JavaTM Programming with CORBATM: Advanced Techniques for Building Distributed Applications", Wiley, 3rd edition,January, 2004.
Web Sites / Links	1. www.webopedia.com 2. middlewaretech.com 3. www.microsoft.com

Content Beyond the Syllabus:
1. Middleware technologies in oracle
2. Applications of MT

Subject Title	Cloud Computing	Semester	V
Subject Code	17P5CAE12	Specialization	NA
Type	Elective-III	L:T:P:C	4 : 0 : 0 : 4

Objectives:
   To learn about various data structures methods with implementation algorithms.

Unit	Syllabus Contents	Number of Sessions
I	Introduction: Defining cloud computing-Cloud Types-Examining the characteristics of Cloud Computing-Assessing the Role of Open Standards. Understanding Cloud Architecture – Exploring the cloud computing Stack-Connecting to the Cloud.	10
II	Understanding services and applications by types: Defining Infrastructure as a Service (IaaS)- Defining Platform as a Service (PaaS)- Defining Software as a Service (SaaS). Understanding Abstraction and Virtualization: Using Virtualization Techniques-Load Balancing and Virtualization- Porting Applications. Exploring Platform as a Service: Defining Services- Using Paas Application Frameworks.	10
III	Using Google Web Services: Exploring Google Applications-Surveying the Google Applications Portfolio- Exploring the Google Toolkit- Working Google App Engine. Using Amazon Web Services: Understanding Amazon Web Services-Amazon Web Service Components and Web Servers-Working with Amazon Storage System-Understanding Amazon Database Services. Using Microsoft Cloud Services: Exploring Microsoft Cloud Services-Defining Windows Azure Platform- Using Windows Live.	10
IV	Exploring Cloud Infrastructure: Managing the Cloud: Administrating the clouds-Cloud Management Products-Emerging Cloud Management Standards. Understanding Cloud Security: Securing the Cloud-Securing Data-Establishing Identity and Presence.	10
V	Understanding Cloud Applications: Applications in the Clouds-Application and Cloud APIs. Working with Cloud Based Storage: Measuring the Cloud Digital World-Provisioning Cloud Storage- Exploring Cloud backup	10

	Solutions-Cloud Storage Interoperability.	

	Learning Resources
Text Books **&** **Reference** **Books**	1. Barrie Sosinsky "Cloud Computing Bible ", Wiley Publications, 2015 Reprint . 2. Ricardo Puttini, Thomas Erl, and Zaigham Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Prentice-Hall, 2013. 3. Rajkumar Buyya, Chiristian Vercchiola, S.Thamarai Selvi," Mastering Cloud Computing: Foundations and Applications Programming", Morgan Kaufman Publisher. Ray Rafaels, "Cloud Computing: From Beginning to End".
Web Sites / Links	1. www.sciencedirect.com 2. www.springer.com 3. www.webopedia.in 4. www.tutorialspoint.com 5. www.w3schools.com

Content Beyond the Syllabus:
1. Application of cloud services
2. Exploring the cloud mail services
3. Communicating with cloud
4. Working with mobile web services

ELECTIVE – IV

Subject Title	Digital Image Processing	Semester	V
Subject Code	17P5CAE13	Specialization	NA
Type	**Elective-IV**	L:T:P:C	**4 : 0 : 0 : 4**

Objectives:

To impart the best concepts of image processing and also their qualities and methods.

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.	**10**
II	The Image, its Mathematical Background: Overview – Linear Integral Transforms. Data Structures for Image Analysis: Level of Image Data Representation – Traditional Image Data Structures – Hierarchical Data structures. Image Pre-processing: Pixel Brightness Transformations - Geometric transformations – Local pre-processing: Image smoothing, Edge Detectors – Image Restoration.	**10**
III	Segmentation : Thresholding – Edge Based Segmentation : Edge Image Thresholding, Border tracing - Region Based Segmentation – Matching – Shape Representation and Description: Region Identification – Contour Based Shape Representation and Description- Chain codes, Simple Geometric Border Representation - Region Based Shape Representation and Description, Simple Scalar Region Descriptors.	**10**
IV	Object recognition: Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems- Mathematical Morphology – Basic Morphological concepts – Binary Dilation and Erosion.	**10**
V	Image Data Compression: Image Data Properties – Discrete Image Transforms in Image Data Compression – Predictive Compression Methods – Vector Quantization – Hierarchal and Progressive Compression Methods –	**10**

	Comparison of Compression Methods – Coding –JPEG Image Compression.	

Learning Resources		
Text Books	1. Rafael C. Gonzalez, Richard E.Woods, Digital Image Processing, Prentice Hall, Third Edition, 2008. (Unit-1: Chapter 1-1.1, 1.3, 1.4, 1.5, Chapter 2 -2.1, 2.2, 2.3, 2.4, 2.5). 2. Sonka, Hlavac, Boyle, Digital Image Processing and Computer Vision, Cengage Learning, 2009 (Unit -II: Chapter 3 – 3.1, 3.2 ,Chapter-4, Chapter-5,5.1, 5.2,5.3, 5.3.1, 5.3.2, 5.4 Unit-III: Chapter 6 -6.1, 6.2, 6.2.1, 6.2.3., 6.3, 6.4, Chapter 8 – 8.1, 8.2,8.2.1,8.2.2, 8.3, 8.3.1 Unit-IV- 4 – Chapter 9,9.1,9.2, 9.3,9.7, Chapter 13-13.1, 13.3 Unit-5: Chapter 14- 14.1, 14.2, 14.3, 14.4, 14.5,14.6, 14.8, 14.9,14.9.1)
Reference Books	1. Anil.K.Jain, Fundamentals of Digital Image Processing, Prentice-Hall, 1989. 2. Chanda & Majumdar, Digital Image Processing and Analysis, Prentice Hall ,3rd Edition. 3. Richard Fairly, "Software Engineering Concepts", TMGH, 2004. 4. Rajib Mall, "Fundamentals of Software Engineering", PHI, Second Edition, 2000. 5. Carlo Ghezzi, Mehdi Jazayeri, Dino Mndrioli, "Fundamentals of Software Engineering ", Second Edition, PHI/Pearson Education Asia, 2000
Web Sites / Links	1. www.imageprocessing place.com 2. www.mathworks.com 3. www.neurotechnology .com

Content Beyond the Syllabus:
1. Digital Image processing in remote sensing

2. Digital image processing in Agriculture

Subject Title	Cryptography and Network Security	Semester	IV
Subject Code	17P5CAE14	Specialization	NA
Type	**Elective-II**	**L:T:P:C**	**4 : 0 : 0 : 4**

Objectives:

This subject brings the view of networks and it's secure in two approaches

1) To know about the addressing and protocol function in network
2) To know the secure techniques in the network

Unit	Syllabus Contents	Number of Sessions
I	Types of Physical Medium – Topologies – Wireless Networking: Wireless Protocols. Data Link Layer: Layered Data Link Protocols – SLIP and PPP-MAC and ARP. Network Layer: Routing Risks-Addressing-Fragmentation-Security.	**10**
II	Internet Protocol: IP Addressing-ICMP-Security options. Transport Layer: Common Protocols-Transport Layer Functions-Gateways. TCP: Connection Oriented Protocols-TCP Connections-UDP. Session Layer: Session State Machine-Session and Stacks. SSL: SSL Functionality-Certificates. SSH: SSH and Security-SSH Protocols. STMP: Email Goals-Common Servers. HTTP: HTTP Goals-URL.	**12**
III	Security: Importance-Threat Models-Concepts-Common Mitigation Methods. Network theory: Standards Bodies-Network Stacks-Multiple Stacks-Layers and Protocols-Common Tools. Cryptography: Securing Information-Necessary Elements-Authentication and Keys-Cryptography and Randomness-Hashes-Ciphers-Encryption-Steganography.	**10**
IV	Classical Encryption Techniques-Block Ciphers and the Data Encryption Standards- Symmetric Ciphers. Principles of Public Key Cryptosystems and RSA Algorithm-Key Management.	**10**
V	Message Authentication and Hash Function-Digital Signatures and	**8**

	Authentication Protocols-Email Security—Web Security-Intrusion-Firewall.	

Learning Resources

Text Books	1. Neal Krawetz, Introduction Network Security, India Edition, Thomson Delmar Learning.2007(Unit-I:5.1,5.4,7.2,8.3,9,10,11.2,11.3,11.5,11.9, unit-II: 12.1,12.2,12.4,14.1,14.2,14.3,15.1,15.2,15.7,16.2,16.3, 19.2,19.3,20.1, 20.2,22.2, 23.1,23.2, UnitIII:1.1,1.2,1.3,1.4,3.1,3.2,3.3,3.4,3.5,4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8) 2. William Stallings, Cryptography and Network Security, Prentice-Hall of India,4th edition,2007, (Unit-IV: 2,3,6,9,10, Unit-V: 11,13,15,17,18,20)
Reference Books	1. .K.Pachghare, Cryptography and Information Security, PHI Learning Private Limited 2009. 2. Andrew S. Tanenbaum, Computer Networks, PHI 4th edition . 2009.
Web Sites / Links	1. *williamstallings.com* 2. *www.sanfoundry.com* 3. *www.amazon.in* 4. *www.uptu.ac.in* 5. *www.ibm.com* 6. *www.cs.iit.edu*

Content Beyond the Syllabus:
1. Authentication applications
2. Web communication

Subject Title	Enterprise Resource Planning	Semester	V
Subject Code	17P5CAE15	Specialization	NA
Type	**Elective-IV**	L:T:P:C	**4 : 0 : 0 : 4**

Objectives:

    The main objective is to provide the Enterprises and its maintenance in effective manner using various ERP packages**.**

Unit	Syllabus Contents	Number of Sessions
I	Introduction to ERP: Enterprise An Overview-Introduction to ERP-Basic ERP concepts-Risks of ERP- Benefits of ERP.ERP and Technology: ERP and Related Technologies-Business Intelligence, Business Process Reengineering (BPR)-Data Warehousing,-Data Mining-O LAP- SCM.	10
II	ERP Implementation: Implementation challenges-ERP implementation strategies- ERP implementation lifecycle- Implementation Methodology-Vendors and Consultants-Contracts with Vendors-Consultants and Employees-Training and education-Project Management and Monitoring-Success and failure factors of an ERP implementation.	10
III	The Business modules: Business modules of an ERP Package-Finance- Manufacturing-Human Resources-Plant Maintenance-Materials Management-Quality Management-Sales and Distribution and service.	10
IV	The ERP Market: ERP market Place and market place dynamics- SAP AG- Oracle corporation-People soft-JD Edwards- QAD Inc.-SSA global.	10
V	ERP present and future: Turbo Charge the ERP System- EAI- ERP and E-business- ERP and Internet and WWW- Future Directions and trends in ERP.	10

Learning Resources

Text Books	1. Alexis Leon, "ERP Demystified", Second Edition, Tata McGraw Hill, New Delhi, 2008.
Reference Books	1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000. 2. Ashim Raj Singla,"Enterprise Resource Planning ",2008 , Cengage Learning India Pvt.Limited ,NewDelhi.
Web Sites / Links	1. www.imc.com 2. www.webopeda.com 3. www.umsl.edu 4. www.oracle .com 5. www.informit.com

Content Beyond the Syllabus:

1. ERP software packages
2. ERP services

Subject Title	Internet of Things	Semester	V
Subject Code	17P5CAE16	Specialization	NA
Type	Elective-IV	L:T:P:C	4 : 0 : 0 : 4

Objectives: To understand about Internet of Things and to get basic knowledge.

Unit	Syllabus Contents	Number of Sessions
I	Introduction to Internet of Things, Physical design of IoT, Logical Design of IoT, IoT enabling Technologies. - Domain Specifics of IoT, home automation, cities, Environment, Energy, Retails, Logistics, Agriculture, Industry,Health and Life style.	10
II	IoT and M2M - Difference between IoT and M2M,SDN and NFV for IOT. IOT System management with NETCONF-YANG-Need for IOT system management, SNMP, Network operator environment, NETCONF, YANG.	10
III	Developing Internet of Things: IOT Platforms design methodology, Introduction, IOT Design methodology, Case study on IoT System on weather monitoring. IoT Systems logical design using Python, Introduction, Installing python, Python data types and data structures, Control flow. Functions, Modules.	10
IV	Packages, File handling, Date time operations, classes, Python packages of interest for IoT. IoT physical devices and end points, what is an IoT Device, Exemplary device: Raspberry PI, about the board, Linux on Raspberry PI, Raspberry PI interfaces, Other IoT devices.	10
V	Data analytics for IoT-Introduction, Apache Hadoop, Using Hadoop map reduce for batch data analysis. Case studies- Illustrating IoT design-Introduction, Home automation, cities, environment, agriculture.	10

Learning Resources	
Text Books	1. Internet of Things - A Hands on Approach, Arsdeep Bahga & Vijay Mandisetti, 2014. 2. Building the Internet of Things: Implement New Business Models, Disrupt, Maciej Kranz, Willey Publications, 2016 3. Designing the Internet of Things By Adrian McEwen, Hakim Cassimally, Willey Publications 2015
Reference Books	1. Internet of Things: Principles and Paradigmsby Rajkumar Buyya, Amir Vahid Dastjerdi morgan Kaufmann 2014
Web Sites / Links	1. http://internetofthingsagenda.techtarget.com 2. http://www.businessinsider.com/what-is-the-internet-of-things

Content Beyond the Syllabus:

1. Internet Of Things Connectivity

2. Designing for the Internet of Things