KUMARAGURU COLLEGE OF TECHNOLOGY

(Autonomous Institution Affiliated to Anna University, Chennai)
COIMBATORE – 641049

CURRICULUM & SYLLABUS
CHOICE BASED CREDIT SYSTEM
(REGULATIONS 2015)

I to VI Semester

Master of Computer Applications

Department of Computer Applications

Department of MCA

Vision

The department

- Seeks to create academic programmes and a campus culture that imbibes a socially committed professionalism which would in turn feed into the overall development of the society and make global citizens and leaders out of the students.
- Aims to become a highly recognized, research driven department with good infrastructure, developing industry ready products.

Mission

- The Department is committed to set standards of excellence in its academic programmes by enabling its students to achieve a blending of knowledge acquisition and applications of such knowledge in real life situations.
- It is also aimed to equip them to adapt themselves to changing global and local needs upholding professional ethics and contribute their might in transforming India into a world leader in technological advancement and prosperity.

Kumaraguru College of Technology

Coimbatore – 641 049

Regulations 2015

CBCS – PG Curriculum

Name of the PG Programme: MCA

Foundation Courses (FC)							
S. No.	**Course Code**	**Course Title**	**Hours/Wk & Credits**				**Preferred Semester**
			L	**T**	**P**	**C**	
1.	P15MA*T*110	Mathematical Foundations of Computer Science	3	1	0	4	1
2.	P15CA*T*104	Accounting and Financial Management	3	1	0	4	1
3.	P15MA*T*202	Probability and Applied Statistics	3	1	0	4	2

Professional Core (PC)							
S. No.	**Course Code**	**Course Title**	**Hours /Wk & Credits**				**Preferred Semester**
			L	**T**	**P**	**C**	
1.	P15CA*T*101	Advanced Database Management Systems	3	0	0	3	1
2.	P15CA*T*102	Operating Systems	3	1	0	4	1
3.	P15CA*T*103	Data Structures	3	0	0	3	1
4.	P15CA*T*201	Advanced Data Structures	3	0	0	3	2
5.	P15CA*T*202	Computer Networks	3	0	0	3	2
6.	P15CA*T*203	Software Engineering	3	0	0	3	2
7.	P15CA*T*204	Ethics in Computing	3	0	0	3	2
8.	P15CA*T*301	Data Warehousing and Data Mining	3	1	0	4	3
9.	P15CA*T*302	Information Security	3	0	0	3	3

10.	P15CA*T*303	Enterprise Application Development	3	0	0	3	3
11.	P15CA*T*304	Object Oriented Analysis & Design	3	0	0	3	3
12.	P15CA*T*401	Software Project Management	3	0	0	3	4
13.	P15CA*T*402	Business Intelligence	3	1	0	4	4
14.	P15CA*T*403	Service Oriented Architecture	3	0	0	3	4
15.	P15CA*T*501	Software Testing and Quality Assurance	3	0	0	3	5
16.	P15CA*T*502	Big Data Analytics	3	1	0	4	5
17.	P15CA*T*503	Managing Technical People	3	0	0	3	5

Professional Electives (PE)

S. No.	Course Code	Course Title	Hours /Wk & Credits				Preferred Semester
			L	T	P	C	
1.	P15CA*T*E11	Business Process Management	3	0	0	3	3
2.	P15CA*T*E12	Distributed Operating Systems	3	0	0	3	3
3.	P15CA*T*E13	Cyber Security	3	0	0	3	3
4.	P15CA*T*E14	Agent Based Intelligent Systems	3	0	0	3	3
5.	P15CA*T*E15	Management Information Systems	3	0	0	3	3
6.	P15CATE16	Knowledge Management	3	0	0	3	3
7.	P15CA*T*E17	Enterprise Resource Planning	3	0	0	3	3
8.	P15CA*T*E21	Cryptography and Network Security	3	0	0	3	4
9.	P15CA*T*E22	Distributed Computing	3	0	0	3	4
10.	P15CA*T*E23	Cloud Computing	3	0	0	3	4
11.	P15CA*T*E24	Electronic Commerce	3	0	0	3	4

12.	P15CA*T*E25	Information Retrieval	3	0	0	3	4
13.	P15CA*T*E26	Ruby Programming	3	0	0	3	4
14.	P15CA*T*E27	Web Mining	3	0	0	3	4
15.	P15CA*T*E31	Unix Internals	3	0	0	3	4
16.	P15CA*T*E32	Data Visualization	3	0	0	3	4
17.	P15CA*T*E33	Information Systems Methodologies	3	0	0	3	4
18.	P15CA*T*E34	Open Source Technologies	3	0	0	3	4
19.	P15CA*T*E35	Semantic Web	3	0	0	3	4
20.	P15CATE36	Digital Image Processing	3	0	0	3	4
21.	P15CA*T*E37	Human Computer Interaction	3	0	0	3	4
22.	P15CA*T*E38	Mobile Computing	3	0	0	3	4
23.	P15MA*T*E15	Numerical Methods	3	0	0	3	4
24.	P15CA*T*E41	Soft Computing	3	0	0	3	5
25.	P15CA*T*E42	Predictive Analytics	3	0	0	3	5
26.	P15CA*T*E43	Strategic Project Management	3	0	0	3	5
27.	P15CA*T*E44	Principles of Management and Organizational Behavior	3	0	0	3	5
28.	P15CA*T*E45	XML and Web Services	3	0	0	3	5
29.	P15CA*T*E46	Machine learning	3	0	0	3	5
30.	P15CATE47	TCP/IP Protocol Suite	3	0	0	3	5
31.	P15CA*T*E48	Software Reliability and Metrics	3	0	0	3	5
32.	P15CA*T*E49	Software Agents	3	0	0	3	5
33.	P15MA*T*E16	Resource Management Techniques	3	0	0	3	5

Employability Enhancement Courses (EEC)							
S. No.	**Course Code**	**Course Title**	**Hours /Wk & Credits**				**Preferred Semester**
			L	**T**	**P**	**C**	
1.	P15CAP403	Mini Project I	0	0	6	3	4
2.	P15CAP503	Mini Project II	0	0	6	3	5
3.	P15CAP601	Project Work	0	0	24	12	6

SEMESTER – I								
S.No	**Course Code**	**Course Title**	**Category**	**Contact Hours**	**Hours/Week & Credits**			
					L	**T**	**P**	**C**
1.	P15MA*T*110	Mathematical Foundations of Computer Science	FC	60	3	1	0	4
2.	P15CA*T*101	Advanced Database Management Systems	PC	45	3	0	0	3
3.	P15CA*T*102	Operating Systems	PC	60	3	1	0	4
4.	P15CA*T*103	Data Structures	PC	45	3	0	0	3
5.	P15CA*T*104	Accounting and Financial Management	FC	60	3	1	0	4
6.	P15CA*P*101	Problem Solving and Programming in ‘C’ Lab	PC	-	0	0	6	3
7.	P15CA*P*102	DBMS Lab	PC	-	0	0	6	3
8.	P15CA*P*103	Multimedia Lab	PC	-	0	0	3	1
Total Credits								25
SEMESTER – II								
S.No	**Course Code**	**Course Title**	**Category**	**Contact Hours**	**Hours /Week & Credits**			
					L	**T**	**P**	**C**
1.	P15MA*T*202	Probability and Applied Statistics	FC	60	3	1	0	4

2.	P15CA*T*201	Advanced Data Structures	PC	45	3	0	0	3
3.	P15CA*T*202	Computer Networks	PC	45	3	0	0	3
4.	P15CA*T*203	Software Engineering	PC	45	3	0	0	3
5.	P15CA*T*204	Ethics in Computing	PC	45	3	0	0	3
6.	P15CA*P*201	Data Structures and C++ Lab	PC	-	0	0	6	3
7.	P15CA*P*202	Programming in Java Lab	PC	-	0	0	6	3
8.	P15CA*P*203	Web Design Lab	PC	-	0	0	6	3
Total Credits								25

SEMESTER – III

S.No	Course Code	Course Title	Category	Contact Hours	Hours /Week & Credits			
					L	T	P	C
1.	P15CA*T*301	Data Warehousing and Data Mining	PC	60	3	1	0	4
2.	P15CA*T*302	Information Security	PC	45	3	0	0	3
3.	P15CA*T*303	Enterprise Application Development	PC	45	3	0	0	3
4.	P15CA*T*304	Object Oriented Analysis & Design	PC	45	3	0	0	3
5.	E1	Elective I	PE	45	3	0	0	3
6.	P15CA*P*301	Data Mining Lab	PC	-	0	0	6	3
7.	P15CA*P*302	J2EE Lab	PC	-	0	0	6	3
Total Credits								22

SEMESTER – IV

S.No	Course Code	Course Title	Category	Contact Hours	Hours /Week & Credits			
					L	T	P	C
1.	P15CA*T*401	Software Project Management	PC	45	3	0	0	3
2.	P15CA*T*402	Business Intelligence	PC	60	3	1	0	4
3.	P15CA*T*403	Service Oriented Architecture	PC	45	3	0	0	3
4.	E2	Elective II	PE	45	3	0	0	3
5.	E3	Elective III	PE	45	3	0	0	3
6.	P15CA*P*401	Service Oriented Architecture Lab	PC	-	0	0	6	3

7.	P15CA*P*402	Cloud Computing Lab	PC	-	0	0	6	3
8.	P15CA*P*403	Mini Project I	EEC	-	0	0	6	3
Total Credits								25

SEMESTER – V

	Course Code	**Course Title**	**Category**	**Contact Hours**	**Hours /Week & Credits**			
					L	**T**	**P**	**C**
1.	P15CA*T*501	Software Testing and Quality Assurance	PC	45	3	0	0	3
2.	P15CA*T*502	Big Data Analytics	PC	60	3	1	0	4
3.	P15CA*T*503	Managing Technical People	PC	45	3	0	0	3
4.	E4	Elective IV	PE	45	3	0	0	3
5.	S1	Self Study / International Certification	PE	45	3	0	0	3
6.	P15CA*P*501	Software Testing Lab	PC	-	0	0	6	3
7.	P15CA*P*502	C#.Net Lab	PC	-	0	0	6	3
8.	P15CA*P*503	Mini Project II	EEC	-	0	0	6	3
Total Credits								25

SEMESTER – VI

S.No	**Course Code**	**Course Title**	**Category**	**Contact Hours**	**Hours /Week & Credits**			
					L	**T**	**P**	**C**
1.	P15CA*P*601	Project Work	EEC	-	0	0	24	12
Total Credits								12

ELETIVES

S.No	**Course Code**	**Course Title**	**Category**	**Contact Hours**	**Hours /Week & Credits**			
					L	**T**	**P**	**C**
1.	P15CA*T*E11	Business Process Management	PE*	45	3	0	0	3
2.	P15CA*T*E12	Distributed Operating Systems	PE	45	3	0	0	3

3.	P15CA*T*E13	Cyber Security	PE	45	3	0	0	3
4.	P15CA*T*E14	Agent Based Intelligent Systems	PE	45	3	0	0	3
5.	P15CA*T*E15	Management Information Systems	PE	45	3	0	0	3
6.	P15CATE16	Knowledge Management	PE	45	3	0	0	3
7.	P15CATE17	Enterprise Resource Planning	PE	45	3	0	0	3
8.	P15CA*T*E21	Cryptography and Network Security	PE	45	3	0	0	3
9.	P15CA*T*E22	Distributed Computing	PE	45	3	0	0	3
10.	P15CA*T*E23	Cloud Computing	PE	45	3	0	0	3
11.	P15CA*T*E24	Electronic Commerce	PE	45	3	0	0	3
12.	P15CA*T*E25	Information Retrieval	PE	45	3	0	0	3
13.	P15CA*T*E26	Ruby Programming	PE	45	3	0	0	3
14.	P15CA*T*E27	Web Mining	PE	45	3	0	0	3
15.	P15CA*T*E31	Unix Internals	PE	45	3	0	0	3
16.	P15CA*T*E32	Data Visualization	PE	45	3	0	0	3
17.	P15CA*T*E33	Information Systems Methodologies	PE	45	3	0	0	3
18.	P15CA*T*E34	Open Source Technologies	PE	45	3	0	0	3
19.	P15CA*T*E35	Semantic Web	PE	45	3	0	0	3
20.	P15CATE36	Digital Image Processing	PE	45	3	0	0	3
21.	P15CATE37	Human Computer Interaction	PE	45	3	0	0	3
22.	P15CATE38	Mobile Computing	PE	45	3	0	0	3
23.	P15MA*T*E15	Numerical Methods	PE	45	3	0	0	3
24.	P15CA*T*E41	Soft Computing	PE	45	3	0	0	3
25.	P15CA*T*E42	Predictive Analytics	PE	45	3	0	0	3
26.	P15CA*T*E43	Strategic Project Management	PE	45	3	0	0	3
27.	P15CA*T*E44	Principles of Management and Organizational Behavior	PE	45	3	0	0	3
28.	P15CA*T*E45	XML and Web Services	PE	45	3	0	0	3
29.	P15CA*T*E46	Machine learning	PE	45	3	0	0	3

30.	P15CATE47	TCP/IP Protocol Suite	PE	45	3	0	0	3
31.	P15CATE48	Software Reliability and Metrics	PE	45	3	0	0	3
32.	P15CATE49	Software Agents	PE	45	3	0	0	3
33.	P15MA*T*E16	Resource Management Techniques	PE	45	3	0	0	3
Total Credits								15

***** All electives should be only in category PE

***** One Credit Courses are offered from Semester I to V

* S1 – The self study course may be chosen from the elective list I to IV,
– Student may undergo and submit any international course certification in computer science from authorized prometric testing centre like Microsoft, Oracle, Cisco, IBM etc.

ONE CREDIT COURSES

Code No.	Course Title	Industry that will offer the course
P15CAIN01	Agile Methodology	Software Development
P15CAIN02	Android Technologies	Product Development
P15CAIN03	Ethical Hacking	Network
P15CAIN04	Internet of Things	Software Development
P15CAIN05	Multimedia Systems	Designing/Animation
P15CAIN06	Soft Skills	Career Development
P15CAIN07	Technical Writing	Career Development
P15CAIN08	Human Excellence – Professional Values	Career Development

SEMESTER I

P15MA*T*110 **MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Solve the system of linear homogeneous as well as non–homogeneous equations and to find the eigen values and eigen vectors of real symmetric as well as non–symmetric matrices.
CO 2: Know the concept and applications of different types of relations and functions.
CO 3: Analyze the given propositions and finding the results using mathematical logic operators.
CO 4: Describe the different types of languages and grammars.
CO 5: Understand the difference between deterministic and non deterministic finite state automata and the conversion of NFA to DFA.

Pre–requisite courses: Nil

MATRIX ALGEBRA **12 Hours**

Matrices – Rank of Matrix – Solving System of Equations – Eigen Values and Eigen Vectors – Inverse of a Matrix – Cayley Hamilton Theorem.

BASIC SET THEORY **12 Hours**

Basic Definitions – Venn Diagrams and Set Operations – Laws of Set Theory – Principle of Inclusion and Exclusion – Partitions – Relations – Properties of Relations – Matrices of Relations – Functions – Injective, Surjective and Bijective Functions.

MATHEMATICAL LOGIC **12 Hours**

Propositions and Logical Operators – Truth Table – Equivalence and Implication – Basic Laws – Functionally Complete Set of Connectives – Normal Forms – Proofs in Propositional Calculus – Predicate Calculus.

FORMAL LANGUAGES **12 Hours**

Languages and Grammars – Phrase Structure Grammar – Classification of Grammars – Pumping Lemma for Regular Languages – Context Free Languages.

FINITE STATE AUTOMATA **12 Hours**

Finite State Automata – Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata (NFA) – Equivalence of DFA and NFA – Equivalence of NFA and Regular Languages.

Theory: 45 Hours **Tutorial: 15 Hours** **Total : 60 Hours**

REFERENCES

1. Kenneth H Rosen, "Discrete Mathematics and Its Applications", 7th Edition, Tata McGraw Hill, 2011.
2. Venkatraman M. K., "Engineering Mathematics", 2nd Edition, Volume II, National Publishing Company, 1989.

P15CA*T*101 **ADVANCED DATABASE MANAGEMENT SYSTEMS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Use the techniques, components and tools of a typical database management system.

CO 2: Design a correct, new database information system for a business functional area and implement the design in either SQL or NoSQL.

CO 3: Understand the concepts of open source databases like MongoDB and MySQL.

Pre–requisite courses: Nil

INTRODUCTION **7 Hours**

Introduction – Database Architecture – Structure of Relational Databases – Database Schema – Schema Diagrams – Relational Query Languages – Keys – Basic Structure of Queries and Operations – Integrity Constraints – ER Model – Why NoSQL.

DATABASE DESIGN **9 Hours**

Relational Database Design – First Normal Form – Second Normal Form – Third Normal Form Boyce – Codd Normal Form – NoSQL: Aggregate Data Model – Distribution Model.

DATABASE IMPLEMENTATION **11 Hours**

Physical Database Design and Tuning – Database Transaction: Transaction Concept and State Recovery: Failure Classification – Log Based Recovery – NoSQL Implementation: Key Value Database – Document Database.

DATABASE FUNCTIONALITY **9 Hours**

Introduction – DB2 – Oracle – Microsoft SQL Server – MySql – MongoDB – Database Connectivity using ODBC and JDBC.

EMERGING TECHNOLOGIES AND APPLICATIONS **9 Hours**

Active Database Concepts and Triggers Distributed Databases: Concepts – Database Design and Types – Database Applications in Mobile Communication – Multimedia Databases – Genome Data Management.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", 6th Edition, Tata McGraw Hill International Edition, 2011.
2. Pramodkumar J. Sadalage and Martin Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", 1st Edition, Addison Wesley Professional, 2012.
3. R. Elmasri and S.B. Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2008.
4. C.J.Date, "An Introduction to Database Systems", 8th Edition, Pearson Education Inc, 2004.

P15CA*T*102 **OPERATING SYSTEMS**

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Know various synchronization, scheduling and memory management issues.

CO 2: Understand about mutual exclusion and deadlock concepts.

CO 3: Understand and analyze various disk scheduling algorithms.

Pre–requisite courses: Nil

INTRODUCTION **8 Hours**

Computer System Organization – Computer System Architecture – Operating System Structure – Operating System Services – User Operating System Interface – System Calls – System Programs – Design and Implementation – Virtual Machines – Debugging.

PROCESS MANAGEMENT **7 Hours**

Process Concepts – Process Scheduling – Operations on Processes – Inter Process Communication – Examples – Threads – Overview – Multi Threading Models – Libraries – Issues.

CPU SCHEDULING **5 Hours**

Basic Concepts – Scheduling Criteria – Scheduling Algorithms.

PROCESS SYNCHRONIZATION **6 Hours**

Background – Critical Section Problem – Peterson's Solution – Synchronization Hardware – Semaphores – Classic Problem of Synchronization – Monitors – System Model.

DEADLOCK **6 Hours**

Deadlock Characterization – Handling Deadlocks – Deadlock Prevention – Avoidance – Detection – Recovery.

MEMORY MANAGEMENT **5 Hours**

Background – Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation.

VIRTUAL MEMORY MANAGEMENT **7 Hours**

Background – Demand Paging – Copy on Write – Page Replacement – Thrashing – Working Set.

I/O MANAGEMENT AND DISK SCHEDULING **6 Hours**

Organization of I/O function – Evolution of I/O function – Types of I/O devices – Logical Structure of I/O functions – I/O Buffering – Disk I/O – Disk Scheduling algorithms – Disk Cache.

FILE SYSTEMS **10 Hours**

File Concept – Access Methods – Directory and Disk Structure – File System Mounting – File Sharing – Protection – File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free Space Management.

CASE STUDIES: Windows 2000, Linux, Unix and Solaris.

Theory: 45 Hours **Tutorial: 15 Hours** **Total: 60 Hours**

REFERENCES

1. Silberschatz and Galvin, "Operating System Concepts", 8th Edition, John Wiley & Sons, Inc., 2008.
2. P.C.Bhatt, "An Introduction to Operating Systems–Concepts and Practice", Prentice Hall of India, 2010.
3. H.M.Deitel, "An Introduction to Operating Systems", 3rd Edition, Pearson Education, 2003.
4. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall, 2011.
5. D. M. Dhamdhere, "Operating Systems: A Concept based Approach", Tata McGraw Hill, 2006.

P15CA*T*103 **DATA STRUCTURES**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the behavior of basic data structures.

CO 2: Analyze a problem and determine the appropriate data structure for the problem.

CO 3: Understand and analyze elementary algorithms: sorting & searching.

Pre–requisite courses: Nil

INTRODUCTION **3 Hours**

Data Structures – Abstract Data Type – Primitive Data Structures – Analysis of Algorithms – Notations.

ARRAYS **5 Hours**

Representation of Arrays – Operation on Arrays – Applications – Polynomials: Addition of Two Polynomials – Multiplication of Two Polynomials – Sparse Matrices: Addition of Two Sparse Matrices – Transpose of a Sparse Matrix.

LIST **5 Hours**

Concepts and Basic Operations on Linked List – Applications – Reversing a Linked List Concatenation of Two Lists – Circular Linked List – Doubly Linked List – Doubly Circular Linked List .

STACK **5 Hours**

Definition – Operations on Stack – Static and Dynamic Implementation of a Stack – Applications – Recursion – Infix, Prefix & Postfix Expressions – Balancing the Parentheses in an Expression – Arithmetic Expression Evaluation.

QUEUE **5 Hours**

Definition – Operations on Queue – Static and Dynamic Implementation of a Queue – Types of Queue – Circular Queue – Priority Queue – DEQueue – Applications – Job Scheduling – Reversing Stack using Queue.

TREE **5 Hours**

Tree Terminology – Binary Tree – Binary Tree Representation – Binary Search Tree (BST) – Creating BST – Tree Traversals.

GRAPH **5 Hours**

Introduction – Graph Representation – Adjacency Matrix – Adjacency List – Graph Traversals – Applications of Graph.

SORTING ALGORITHM AND ANALYSIS **8 Hours**

Bubble Sort – Insertion Sort – Shell Sort – Selection Sort – Quick Sort – Merge Sort – Heap Sort – Radix Sort – Analysis.

SEARCHING ALGORITHM AND ANALYSIS **4 Hours**

Linear Search – Binary Search – Fibonacci Search – Analysis.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Vijayalakshmi Pai G.A, "Data Structures and Algorithms: Concepts Techniques and Applications", Mc Graw Hill, 2009.
2. Aaron M Tanenbaum, Moshe J Augenstein and Yedidyah Langsam, "Data Structures using C and C++", PHI Learning, 2009.
3. D.S.Malik, "Data Structures using C++", 2nd Edition, Cengage Learning Inc, 2009.
4. Adam Drozdek, "Data Structures and Algorithms in C++", 3rd Edition, Cengage Learning Inc, 2004.
5. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2006.
6. Sahni Sartaj, "Data Structures, Algorithms and Applications in C++", WCB / Tata McGraw Hill, 2005.

P15CA*T*104 **ACCOUNTING AND FINANCIAL MANAGEMENT**

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO 1:Understand the balance sheet preparation and do analysis.
CO 2: Understand the budget preparation and control of a company.
CO 3: Decide about the state of affairs of a particular firm / company.
CO 4: Ensure the preparation of fiscal policies of the organization.
CO 5: Ensure the factors to be considered in investment policies.

Pre–requisite courses: Nil

FINANCIAL ACCOUNTING **14 Hours**

Meaning and Scope of Accounting – Principles – Concepts and Conventions – Double Entry Book Keeping – Books of Accounts: Preparation of Journals – Ledger – Trial Balance – Trading, Profit and Loss Account – Balance Sheet.

COST ACCOUNTING **14 Hours**

Meaning – Objectives – Elements of Cost – Preparation of Cost Sheet – Methods of Costing – Marginal Costing – Cost Volume Profit Analysis – Break Even Analysis – Fund Flow Analysis – Cash Flow Analysis.

BUDGETS AND BUDGETING CONTROL **12 Hours**

Budgets and Budgetary Control – Meaning – Types – Sales Budget – Production Budget – Cost of Production Budget – Flexible Budgeting – Cash Budget – Master Budget – Zero Base Budgeting.

FINANCIAL MANAGEMENT AND COST OF CAPITAL **10 Hours**

Objectives and Functions of Financial Management – Cost of Capital – Factors Affecting Cost of Capital – Capital Budgeting: Net Present Value – Internal Rate of Return – Profitability Index – Pay – Back and Discounted Pay – Back Method.

CAPITAL STRUCTURE AND WORKING CAPITAL MANAGEMENT **10 Hours**

Capital Structure – Factors Affecting Capital Structure – Dividend Policy – Types of Dividend Policy – Concepts of Working Capital – Working Capital Policies – Factors Affecting Working Capital – Estimation of Working Capital Requirements.

Theory: 45 Hours **Tutorial: 15 Hours** **Total: 60 Hours**

REFERENCES

1. S.N.Maheswari, “Financial and Management Accounting”, Sultan Chand & Sons, 2009.
2. R.K Sharma and Shashi V. K.Gupta, “Management Accounting: Principles of Practice”, Kalyani Publishers, 2006.
3. I.M.Pandey, “Financial Management”, Vikas Publications, 2010.
4. S.P.Iyengar, “Cost and Management Accounting”, Sultan Chand & Co, 2008.

5. I.M.Pandey, “Elements of Management Accounting”, Vikas Publishing House, 2008.
6. R.L Gupta and V.K.Gupta , “Financial Accounting”, Sultan Chand & Sons, 2004.

P15CA*P*101 **PROBLEM SOLVING AND PROGRAMMING IN 'C' LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Employ good software engineering practices such as incremental development, data integrity checking and adherence to style guidelines.

CO 2: Select and model data using primitive and structured types.

CO 3: Construct programs that demonstrate effective use of C features including arrays, structures, pointers and files.

Pre–requisite courses: Nil

1. Simple programs to understand the concepts of data types and expressions
2. Familiarizing conditional and control statements
3. Implementing repetition statements
4. Usage of single and multi dimensional arrays including storage operation
5. Defining and handling of strings
6. Implementation of functions and recursive functions
7. Defining and handling structures, array of structures and union
8. Implementation of pointers, operation on pointers and dynamic storage allocation
9. Creating and processing data files

P15CA*P*102 **DBMS LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Design and implement a database schema for a given problem domain.
CO 2: Populate and query a database using SQL DDL/DML commands.
CO 3: Program in PL/SQL including stored procedures, stored functions, cursors, packages.
CO 4: Design and build a GUI application using a 4GL.

Pre–requisite courses: Nil

1. DDL & DML – data types, create, alter, drop table, integrity constraints
2. Insert, delete and update commands
3. DCL & TCL – grant, revoke, rollback and commit
4. Select command with operators like arithmetic, comparison, logical, order by, group by etc.
5. SQL Functions – date, numeric, character, conversion, avg, max, min, sum, count
6. Set operations – union, intersect and minus
7. Join query concept – simple, equi, non–equi, self, outer join
8. Complex and sub queries
9. Database objects – view, synonym, index, sequence – create, alter and drop
10. Report writer using SQL
11. PL/SQL – Introduction – character set, data types – execution
12. PL/SQL attributes %type, %rowtype, function comparison, if condition, loop, for, while and goto etc.
13. Record management using cursors
14. Function – definition and implementation
15. Database triggers – syntax, parts and types of triggers
16. Develop a package using database connectivity
17. Exercises using NoSQL database

P15CA*P*103 **MULTIMEDIA LAB**

L	T	P	C
0	0	3	1

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Design and implement an animation for various themes.

CO 2: Prepare multimedia advertisement.

CO 3: Edit image.

Pre–requisite courses: Nil

1. Program to generate frame by frame animation using multimedia flash
2. Program to create an advertisement for a product using techniques like guide layer, masking, morphing, and onion skin using flash
3. Program to create an image and demonstrate basic image editing using Photoshop
4. Program to demonstrate rasterization and filtering of layers, blending effects, text effects using Photoshop
5. Program to create a logo design using adobe illustrator
6. Audio and video editing exercises

SEMESTER II

P15MA*T*202

PROBABILITY AND APPLIED STATISTICS

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1: To be able to test hypothesis using various tests for large and small samples.

CO2: To analyze experiments based on one–way, two–way and latin square classifications.

CO3: To understand the basics of quality control using control charts.

Pre–requisite courses: Nil

STATISTICAL MEASURES 12 Hours

Measures of Central Tendency: Mean, Median and Mode – Measures of Variation – Range, Standard Deviation, Mean Deviation and Coefficient of Variation – Correlation and Regression: Karl Pearson's Coefficient of Correlation – Rank Correlation – Regression Lines (Definitions and Simple Numerical Problems Only).

PROBABILITY AND RANDOM VARIABLE 12 Hours

Axioms of Probability – Conditional Probability – Total Probability – Baye's Theorem – Random Variable – Distribution Function – Properties – Probability Function – Probability Density Function –Moments and Moment Generating Function – Properties.

STANDARD DISTRIBUTIONS 12 Hours

Binomial, Poisson and Normal Distributions – Properties – Fitting of Binomial, Poisson and Normal Distributions to Data.

TESTING OF HYPOTHESIS 12 Hours

Testing of Hypothesis for Large Samples (Single Mean, Difference of Means, Single Proportion, Difference of Proportions) – Small Samples Tests Based on T and F Distributions (Single Mean, Difference of Means, Paired *t*–Test and Variance Ratio Test) – Chi–square Test for Independence and Goodness of Fit – Simple Numerical Problems Only.

DESIGN OF EXPERIMENTS AND QUALITY CONTROL 12 Hours

Analysis of Variance – One Way Classification – Two Way Classification – CRD – RBD – Latin Square – LSD Concept of Process Control – Control Charts for Variables – $\overline{X}$, R–Charts – Control Charts for Attributes – p, np, c–charts –Tolerance Limits.

Theory: 45 Hours **Tutorial: 15 Hours** **Total: 60 Hours**

REFERENCES

1. Veerarajan T, "Probability and Statistics", Tata McGraw Hill, New Delhi, 2007 & 2nd Reprint 2004.
2. Gupta S. P, "Statistical Methods", Sultan Chand & Sons Publishers, 2004.
3. Johnson R. A, "Miller & Freund's Probability and Statistics for Engineers", 6th Edition, Pearson Education, Delhi, 2000.

4. Gupta S.C, and Kapur, J.N., "Fundamentals of Mathematical Statistics", 9th Edition, Sultan Chand, New Delhi, 1996.
5. Walpole R. E., Myers S.L. and Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education Inc, 2002.

P15CA*T*201 ADVANCED DATA STRUCTURES

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the behavior of advanced data structures.
CO 2: Analyze and determine the appropriate data structure for a problem.
CO 3: Apply the algorithms and design techniques to solve problems.
CO 4: Analyze the complexities of various problems in different domains.

Pre–requisite courses:

1. P15CA*T*103 - Data Structures

INTRODUCTION **5 Hours**

Algorithm – Fundamentals of Analysis of Algorithm Efficiency – Asymptotic Notations – Mathematical Analysis of Recursive and Non–recursive Algorithms.

TREES **7 Hours**

B – Trees (Definition, Insertion, Deletion) – B + Trees – Splay Trees – AVL Trees – Binomial Heap.

TABLES **7 Hours**

Introduction – Operations – Hash Table: Hash functions – Implementation – Overflow Handling Techniques – Linear Open Addressing – Chaining – Successful and Unsuccessful Searches – Data Structures for Disjoint Sets: Disjoint Set Operations – Linked List representation of Disjoint Sets.

DIVIDE AND CONQUER **5 Hours**

Introduction – Example and Analysis: Multiplication of Large Integer – Strassen's Multiplication – Finding Maximum and Minimum.

GREEDY METHOD **6 Hours**

Introduction – Example and Analysis: Prim's Algorithm, Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Coding.

DYNAMIC PROGRAMMING **5 Hours**

Introduction – Example and Analysis: Warshall's Algorithm – Floyd's Algorithm.

BACK TRACKING **5 Hours**

Introduction – Example and Analysis: n–Queens Problem – Hamiltonian Circuit Problem – Subset Sum Problem.

BRANCH AND BOUND **5 Hours**

Introduction – Example and Analysis: Assignment Problem – Knapsack Problem – Travelling Salesman Problem.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 2nd Edition, Pearson Education, 2007.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2006.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein "Introduction to Algorithms", The MIT Press, 2009.
4. Vijayalakshmi Pai G.A, "Data Structures and Algorithms: Concepts Techniques and Applications", Mc Graw Hill, 2009.
5. Horowitz Ellis and Sartaj Sahni, "Fundamentals of Computer Algorithms", Galgotia Publications, 2004.
6. Sahni Sartaj, "Data Structures, Algorithms and Applications in C++", WCB / Tata McGraw Hill, 2005.

P15CA*T*202 **COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Identify the various computer network protocol design models and the usage of various types of transmission media and working of LAN technology.

CO 2: Understand the IP addressing, routing, congestion control and flow control concepts.

CO 3: Understand the various network applications and the supporting protocols.

CO 4: Familiarize the various wireless LAN concepts and the design of adhoc wireless network.

Pre–requisite courses: Nil

PHYSICAL AND DATA LINK LAYER **9 Hours**

Introduction – Network Models – OSI Model – Layers in the OSI Model – Transmission Media – Guided Media – Unguided Media – Switching – Circuit Switched Networks – Datagram Networks –Virtual Circuit Networks – Error Detection and Correction – Data Link Control – Multiple Access – Wired LANs – Connecting LANs, Backbone Networks – Virtual LANs.

NETWORK AND TRANSPORT LAYER **9 Hours**

Logical Addressing – IPv4 Addresses – IPv6 Addresses – Internet Protocol – IPv4 – IPv6 – Network Layer Delivery Forwarding – Unicast Routing Protocols – Process–to–Process Delivery – User Datagram Protocol(UDP) – Transmission Control Protocol(TCP) – Congestion Control and Quality of Service(QoS) – Congestion Control – Techniques to Improve QoS.

APPLICATION LAYER **9 Hours**

Domain Name System(DNS) – Name Space – DNS – Distribution of Name Space – DNS in the Internet – Resolution – DNS Messages – Types of Records – Remote Logging – Electronic Mail – Simple Mail Transfer Protocol(SMTP) – File Transfer – World Wide Web(WWW) – Hyper Text Transfer Protocol(HTTP) – Simple Network Management Protocol(SNMP) – Security – Cryptography – Network Security.

WIRELESS LAN **9 Hours**

Fundamentals of Wireless – LANs, PANs, WANs, MANs – Wireless Internet: IEEE 802.11 and ETSI, HIPER–LAN Standards – Bluetooth – HomeRF – Cellular Concept and Architecture – First, Second and Third Generation Cellular Networks – Mobile IP – TCP in Wireless Domain.

AD HOC WIRELESS NETWORKS **9 Hours**

Ad hoc Wireless Networks – Issues and Challenges in Infrastructure–less Networks – MAC Protocols for Adhoc Wireless Networks – Issues in Designing – Design Goals – Classifications – Routing Protocols – Introduction – Issues – Classification – Wireless Sensor Networks – Introduction – Sensor Network Architecture – MAC Protocols for Sensor Networks – Location Discovery.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Behrouz A. Forouzan, "Data Communication and Networking", 5th Edition, Tata McGraw Hill, 2010.
2. C. Siva Ram Murthy and B.S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", 15th Edition, Pearson Education, 2014.
3. Andrew S.Tanenbaum, "Computer Networks", 4th Edition, Prentice Hall, 2003.
4. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", 4th Edition, Morgan Kaufmann Publishers, 2007.

P15CA*T*203 SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1:Get an insight into the processes of software development.

CO 2: Understand the problem domain for developing SRS and various models of software engineering.

CO 3: Model software projects into high level design using DFD, UML diagrams.

CO 4: Measure the process performance using various metrics.

Pre–requisite courses: Nil

INTRODUCTION 9 Hours

Introduction to Software Engineering – A Generic Process Model – Prescriptive Process Models: Waterfall, Incremental, Prototyping, and Spiral Model – The Unified Process – Agile Development: Agile Process – Extreme Programming (XP) – Adaptive Software Development – Scrum.

MODELING 9 Hours

Modeling Principles – Understanding Requirements – Requirements Modeling: Scenario–Based, Data, Class–Based, Flow–Oriented, Behavioral Modeling.

SOFTWARE DESIGN 9 Hours

Design Concepts – Design Models – Architectural Design: Software Architecture – Architectural Styles – Architectural Design – Component Level Design: Component – Designing Class Based and Traditional Components.

QUALITY MANAGEMENT 9 Hours

Quality Concepts – Review Techniques – Software Quality Assurance – A Strategic Approach to Software Testing – Strategic issues – Software Configuration Management (SCM) – SCM Repository – SCM Process – Software Maintenance and Supportability.

REENGINEERING AND SOFTWARE PROCESS IMPROVEMENT 9 Hours

Reengineering – Business Process Reengineering – Software Reengineering – Reverse Engineering – Restructuring – Software Process Improvement (SPI) – SPI Process – The CMMI – The People CMM – Other SPI Frameworks.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Roger Pressman S., "Software Engineering: A Practitioner's Approach", 7th Edition, Tata McGraw Hill, 2010.
2. Pfleeger and Atlee, "Software Engineering", Pearson Education, 2006.
3. Carlo Ghezzi, Mehdi Jazayari & Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall of India, 2010.
4. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education, 2009.

P15CA*T*204 ETHICS IN COMPUTING

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Examine situations and to internalize the need for applying ethical principles, values to tackle with various situations.

CO 2: Develop a responsible attitude towards the use of computer as well as the technology.

CO 3: Envision the societal impact on the products/ projects they develop in their career.

CO 4: Understand the code of ethics and standards of computer professionals.

CO 5: Analyze the professional responsibility and empowering access to information in the work place.

Pre–requisite courses: Nil

COMPUTER ETHICS INTRODUCTION AND COMPUTER HACKING **9 Hours**

A General Introduction – Computer Ethics: An Overview – Identifying an Ethical Issue – Ethics and Law – Ethical Theories – Professional Code of Conduct – An Ethical Dilemma – A Framework for Ethical Decision Making – Computer Hacking – Introduction – Definition of Hacking – Destructive Programs – Hacker Ethics – Professional Constraints – BCS Code of Conduct – To Hack or Not To Hack? – Ethical Positions on Hacking.

ASPECTS OF COMPUTER CRIME AND INTELLECTUAL PROPERTY RIGHTS **9 Hours**

Aspects of Computer Crime Introduction – What is Computer Crime – Computer Security Measures – Professional Duties and Obligations – Intellectual Property Rights – The Nature of Intellectual Property – Intellectual Property – Patents, Trademarks, Trade Secrets, Software Issues, Copyright – The Extent and Nature of Software Piracy – Ethical and Professional Issues – Free Software and Open Source Code.

REGULATING INTERNET CONTENT, TECHNOLOGY AND SAFETY **9 Hours**

Introduction – In Defense of Freedom Expression – Censorship – Laws Upholding Free Speech – Free Speech and the Internet – Ethical and Professional Issues – Internet Technologies and Privacy – Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk.

COMPUTER TECHNOLOGIES ACCESSIBILITY ISSUES **9 Hours**

Introduction – Principle of Equal Access – Obstacles to Access for Individuals – Professional Responsibility – Empowering Computers in the Workplace – Introduction – Computers and Employment – Computers and the Quality of Work – Computerized Monitoring in the Work Place – Telecommuting – Social, Legal and Professional Issues – Use of Software, Computers and Internet Based Tools – Liability for Software Errors – Documentation Authentication and Control – Software Engineering Code of Ethics and Practices – IEEECS – ACM Joint Task Force.

SOFTWARE DEVELOPMENT AND SOCIAL NETWORKING 9 Hours

Software Development – Strategies for Engineering Quality Standards – Quality Management Standards – Social Networking – Company Owned Social Network Web Site – The Use of Social Networks in the Hiring Process – Social Networking Ethical Issues – Cyber Bullying – Cyber Stalking – Online Virtual World – Crime in Virtual World – Digital Rights Management – Online Defamation – Piracy – Fraud.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Penny Duquenoy, Simon Jones and Barry G Blundell, "Ethical, legal and professional issues in Computing", Middlesex University Press, 2008.
2. George Reynolds, "Ethics in Information Technology", Cengage Learning, 2011.
3. Caroline Whitback, "Ethics in Engineering Practice and Research", Cambridge University Press, 2011.
4. Richard Spinello, "Case Studies in Information and Computer Ethics", Prentice Hall, 1997.
5. John Weckert and Douglas Adeney, "Computer and Information Ethics", Greenwood Press, 1997.
6. Sara Baase, "A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet", 3rd Edition, Prentice Hall, 2008.

P15CA*P*201 DATA STRUCTURES AND C++ LAB

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand the object oriented concepts for implementation.

CO2: Implement the data structure concepts.

Pre–requisite courses:

1. P15CA*T*103 - Data Structures

1. Program to illustrate the concept of classes and objects
2. Program to implement various types of functions
3. Program to implement various types of inheritance
4. Program to illustrate overloading and file operations
5. Program to implement exceptions handling mechanism
6. Program to implement the concept of stack and queue
7. Program to implement the concept of linked list
8. Program using trees
9. Program to illustrate the concept of graphs
10. Program to illustrate various types of sorting

P15CA*P*202 PROGRAMMING IN JAVA LAB

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand the Java programming language in the aspects of designing, coding and implementation.

CO2: Know about new ideas and advances, techniques, and tools and to use them effectively.

Pre–requisite courses: Nil

1. Program to illustrate declaration and access control
2. Program to illustrate assignments
3. Program to illustrate the use of operators
4. Program to illustrate flow control
5. Program to implement various OOPS concepts
6. Program to illustrate APIs like collection, I/O etc.
7. Program to implement the concept of interfaces and packages
8. Program to implement exceptions handling mechanism
9. Program using applets
10. Program to illustrate the use of RMI (Remote Method Invocation)

P15CA*P*203 **WEB DESIGN LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1:Design, develop and host a user friendly website.

CO 2: Know the usage of APIs.

CO 3: Layout management in line with current trend.

Pre–requisite courses:

1. P15CA*P*103 - Multimedia Lab

HTML

1. Write a HTML program for creation of web site with forms, frames, links, etc.
2. Design a web site using HTML and DHTML. Use basic text formatting and image tags
3. Create a personal website using HTML and DHTML
4. Write a HTML program to display a traditional newspaper with the use of table tags

CSS 3.0

1. Implement a CSS programs describing layers, inline, internal and external style sheets
2. Develop a webpage using CSS to set the background color, font, and paragraph
3. Develop a webpage using external CSS to import classes for various HTML tags (Use link and import)
4. Develop a webpage in various styles using CSS

Java Script

1. Develop a web page to validate the registration, user login, user profile and payment by credit card pages using JavaScript by importing a .js file
2. Develop a web page to count the number of words and number of vowels in a passage
3. Develop a web page to display a digital clock at the status bar using JavaScript
4. Develop a tool tip text (for form validation) for a web page

PHP & MySQL

1. Design and implement a user login form
2. Implement an online shopping cart
3. Implement an online exam system
4. Implement an interactive and effective student progress monitoring system

SEMESTER III

P15CA*T*301 **DATA WAREHOUSING AND DATA MINING**

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Discuss about data warehousing architectures and their support for quality attributes.
CO 2: Understand different data mining tasks and the algorithms.
CO 3: Implement and apply basic algorithms for supervised and unsupervised learning.
CO 4: Gain knowledge in latest trends and applications in data mining.

Pre–requisite courses: Nil

DATA MINING **5 Hours**

Data Mining – Kinds of Data Mined – Functionalities – Technologies – Applications – Issues – Getting to Know the Data – Types of Data Sets and Attribute Values.

DATA WAREHOUSING **8 Hours**

Introduction – Definition and Description – Need – Data Warehousing and OLAP: Basic Components – Data Cube and OLAP – Design and Usage – Implementation – Data Generalization by Attribute Oriented Induction – Data Cube Technology.

DATA WAREHOUSE DESIGN **6 Hours**

Dimensional Modeling – Basics – STAR Schema – Snowflake Schema – Fact Constellations Schema.

DATA PREPROCESSING **8 Hours**

Data Quality – Major Tasks in Data Preprocessing – Data Reduction – Data Transformation and Data Discretization – Data Cleaning and Data Integration**.**

ASSOCIATIONS **8 Hours**

Association Rules – Mining Single Dimensional Boolean Association Rules from Transactional Databases – Mining Multi Dimensional Association from Data Warehouses.

CLASSIFICATION AND PREDICTION **6 Hours**

Issues Regarding Classification and Prediction – Decision Tree – Bayesian Classification – Classifier Accuracy.

CLUSTER ANALYSIS **5 Hours**

Basic concepts – Partitioning Methods – k–Means and k–Medoids Algorithms.

OUTLIER ANALYSIS **4 Hours**

Outliers – Types – Challenges – Clustering Based Outlier Detection.

MINING COMPLEX TYPES OF DATA **10 Hours**

Mining Spatial Databases – Mining Multimedia Databases – Mining Time Series Databases and Sequence Data – Mining Text Databases – Mining the World Wide Web – Trends and Applications of Data Mining.

Theory: 45 Hours **Tutorial: 15 Hours** **Total: 60 Hours**

REFERENCES

1. Jiawei Han & Micheline Kamber, "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publishers, 2011.
2. Alex Berson & Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGrawHill, 2008.
3. Usama M.Fayyad, Gregory Piatetsky, Shapiro Padhrai Smyth & Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T Press, 1996.
4. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", 2nd Edition, John Wiley & Sons Inc., 2008.
5. Pang–Ning Tan, Michael Steinbach & Vipin Kumar “Introduction to Data Mining”, 1st Edition, Addison Wesley, 2005.

P15CA*T*302 INFORMATION SECURITY

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the basic concepts of information security, its model and development life cycle.

CO 2: Assess the need for information security and its legal, ethical and its professional issues.

CO 3: Implement and practice security policies.

Pre–requisite courses:

1. P15CA*T*202 - Computer Networks

INFORMATION SECURITY (IS) 9 Hours

Introduction – History – Security – Critical Characteristics of Information – National Security Telecommunications and Information System Security Committee (NSTISSC) – Security Model – Components of an Information System – Securing the Components – Balancing Information Security and Access – The Systems Development Life Cycle – Security Professionals and the Organization.

SECURITY INVESTIGATION 9 Hours

Need for Security – Business Needs – Threats – Attacks – Legal, Ethical and Professional Issues in Information Security – Selecting Risk Control Strategy – Risk Management – Recommended Risk Control Practices.

SECURITY PLANNING 9 Hours

Information Security Policy, Standards and Practices – Information Security Blueprint – Design of Security Architecture – Security Education – Training and Awareness Program – Continuity Strategies.

SECURITY TECHNOLOGY 9 Hours

Physical Design – Firewalls – Protecting Remote Connections – Intrusion Detection and Prevention Systems – Honey Pots, Honey Nets, Padded Cell Systems – Scanning and Analysis Tools – Access Control Devices.

IMPLEMENTATION 6 Hours

Implementing IS – IS Project Management – Technical and Non Technical Aspects of Implementation. Security and Personnel – Introduction – Positioning and Staffing the Security Function – Credentials of IS professionals – Employment Policies and Practices – Internal Control Strategies – Privacy and the Security of Personal Data.

MAINTENANCE 3 Hours

Information Security Maintenance – Security Management Models – Maintenance Model – Digital Forensics.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Michael E Whitman & Herbert J Mattord, “Principles and Practices of Information Security”, Cengage Learning India Private Limited, New Delhi, 2010.
2. Charles P. Pfleeger & Shari Lawrence Pfleeger, “Security in Computing” Pearson Education Pvt. Ltd., 2004.
3. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2006.

P15CA*T*303

ENTERPRISE APPLICATION DEVELOPMENT

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Implement a web tier using Java Servlets and JSPs with supporting Java Beans.

CO 2: Implement a data tier based on JDBC and Web Application Server database connection pooling.

CO 3: Implement a business tier and business logic based on Enterprise Java Beans.

CO 4: Design and develop interactive, client–side, server–side executable web applications.

Pre–requisite courses:

1. P15CA*P*202 - Programming in Java Lab

ENTERPRISE FOUNDATIONS **4 Hours**

Enterprise Architectural overview – object oriented software development for enterprise – Component Based software development for enterprise.

JAVA ENTERPRISE SYSTEM **5 Hours**

Enterprise Data – Basis of JDBC – interfaces – drivers. Advanced JDBC features.

DISTRIBUTED ENTERPRISE COMMUNICATIONS ENABLING **9 Hours**

Distributed Enterprise Communications Basis – RMI Communication – CORBA communication – DCOM Communication – Software Development for RMI Communication

SERVICES FOR DISTRIBUTED ENTERPRISE SYSTEMS **9 Hours**

Naming Services – Directory and Trading services – Activation Services – Message Services – Transaction Services – Security Services and High assurance Enterprise applications.

ENTERPRISE WEB ENABLING **9 Hours**

Web Browsers and Web Servers in Enterprise – Web Programming – XML – Java Servlets – Java Server pages.

INTEROPERABILITYAND MULTITIER ENTERPRISE COMPUTING **9 Hours**

Java Beans – EJB – Enterprise Application Integration – Interoperability between various computing technologies – Tools For Enterprise Computing – Patterns – Frame work

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, “Building Java Enterprise Systems with J2EE", Techmedia, New Delhi, 2005.
2. George Reese, “Database programming, with JDBC and Java" Second Edition, O’Reiliy Publishers, New Delhi, 2000.
3. Dustin R. Callaway – "Inside Servlets” – Addison Wesley Longman Inc, New Delhi, 2011.
4. Tom Valesky – "Enterprise Java Beans" – Addison Wesley Longman Inc. New Delhi, 2008.
5. Ed Roman – "Mastering EJB” – John Wiley & Sons, New Delhi, 2001.

P15CA*T*304 **OBJECT ORIENTED ANALYSIS AND DESIGN**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the basic concepts to identify state and behavior of real world objects.

CO 2: Apply the various object oriented methodologies and choose the appropriate one for solving the problem with the help of various case studies.

CO 3: Implement analysis, design and testing phases in developing a project using object orientation.

Pre–requisite courses:

1. P15CA*T*203 - Software Engineering

INTRODUCTION **6 Hours**

An Overview – Object Basics – Object State and Properties – Behavior – Methods – Messages – Information Hiding – Class Hierarchy – Relationships – Associations – Aggregations – Identity – Dynamic Binding – Persistence – Meta Classes – Object Oriented System Development Life Cycle.

METHODOLOGY AND UML **12 Hours**

Introduction – Survey – Rumbaugh, Booch and Jacobson Methodologies – Unified Approach – Unified Modeling Language – UML Diagrams – Class Modeling – State Modeling – Interaction Modeling – Introduction to Patterns and Frameworks.

OBJECT ORIENTED ANALYSIS **9 Hours**

Identifying Use Case – Business Object Analysis – Use Case 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 – Object Responsibility.

OBJECT ORIENTED DESIGN **7 Hours**

Design Process and Benchmarking – Axioms – Corollaries – Designing Classes – Class Visibility –Refining Attributes – Methods and Protocols – Object Storage and Object Interoperability – MVC Architectural Pattern and Design – Designing the System.

ACCESS LAYER **3 Hours**

Object Persistence – Object Oriented Database Management Systems – Object Relational Systems – Multi Database Systems – Designing Access Layer Classes

VIEW LAYER **3 Hours**

User Interface Design – Designing View Layer Classes – Macro Level Process – Micro Level Process – The purpose of a View Layer Interface.

SOFTWARE QUALITY ASSURANCE AND TESTING 5 Hours

Testing Strategies – Impact of Object Orientation on Testing – Test Cases – Test Plan – Usability Testing – User Satisfaction Testing.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008.
2. Michael R Blaha & James R Rumbaugh, "Object Oriented Modeling and Design with UML", 2nd Edition, Pearson, 2011.
3. Craig Larman, "Applying UML and Patterns", 2nd Edition, Pearson, 2002.
4. Brahma Dathan & Sarnath Ramnath, "Object–Oriented Analysis, Design and Implementation", Universities Press, 2010.
5. Grady Booch, James Rumbaugh & Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education INC, 2009.

P15CA*P*301 **DATA MINING LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the algorithms and techniques used in data mining.

CO 2: Gain expertise in data mining techniques using state–of–the–art open source data mining tools.

CO 3: Use WEKA machine learning toolkit to train and create models from datasets.

Pre–requisite courses: Nil

1. Performing data preprocessing tasks for data mining in WEKA
2. Create a decision tree and train it using the given dataset as the training data. Implement the algorithm to generate a decision tree for the given data set and convert it into "if–then–else rules"
3. Implement FP–Growth and Apriori algorithm
4. Implement association rule mining
5. Implement clustering algorithms
6. Implement Naive Bayes classification
7. Implement K–nearest neighbor classification
8. Implement Linear Regression
9. Design a knowledge flow layout to load, apply attribute selection, normalize the attributes and store the results in a CSV saver using WEKA tool
10. Develop a small application, apply data mining techniques that you have learnt, analyze and compare the results

P15CA*P*302 **J2EE LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the concepts of Servlets, JSP and JDBC.

CO 2: Understand the multi–tier architecture of web–based enterprise applications.

CO 3: Design Servlets, JSPs, JDBC with JAXP and Databases in J2EE application.

CO 4: Understand the deployment descriptor and enterprise application deployment.

Pre–requisite courses:

1. P15CA*P*202 - Programming in Java Lab

1. Program to illustrate Servlets
2. Program to illustrate JSP
3. Program to implement JDBC Concept
4. Programs using LDAP and JNDI
5. Program to implement Hibernate
6. Program using JAXB (Java Architecture for XML Binding)
7. Using Java API for XML Processing (JAXP)
8. Using Java API for XML Messaging (JAXM)
9. Using Java Message Service
10. Program to illustrate JSF (Java Server Faces)

SEMESTER IV

P15CA*T*401

SOFTWARE PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Know the concepts and approaches used to manage software projects.
CO 2: Understand the evaluation and estimation techniques.
CO 3: Know about planning, resource allocation and risks.
CO 4: Apply software project management concepts to real time software projects.

Pre–requisite courses:

1. P15CA*T*203 - Software Engineering
2. P15CA*T*304 - Object Oriented Analysis and Design

INTRODUCTION 9 Hours

Software Project Definition – Need for Software Project Management – Software Projects versus Other types of Projects – Activities covered by Software Project Management – Categories of Software Projects – An Overview of Project Planning – Selection of an Appropriate Project Approach.

PROJECT EVALUATION 5 Hours

Project Portfolio Management – Evaluation of Individual Projects – Cost Benefit Evaluation – Risk Evaluation – Strategic Program Management.

SOFTWARE EFFORT ESTIMATION 6 Hours

Software Effort Estimation – Basics – Effort Estimation Techniques – Top Down and Bottom Up Estimating Approaches – Function Point Analysis – COCOMO Models.

ACTIVITY PLANNING 6 Hours

Activity Planning – Objectives – Project Schedules – Sequencing and Scheduling Activities – Network Planning Models – Formulation of a Network Model – Forward Pass – Backward Pass – Critical Path – Activity Float – Shortening Project Duration – Activity on Arrow Networks.

RISK MANAGEMENT 3 Hours

Risk Management – Categories of Risk – Framework for Dealing with Risk – Critical Chain Scheduling.

RESOURCE ALLOCATION 5 Hours

Resource Allocation – Nature of Resources – Identifying Resources – Scheduling Resources – Creating Critical Paths – Cost Schedules – Scheduling Sequence.

MONITORING AND CONTROL 6 Hours

Monitoring and Control – Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value Analysis – Getting the Project Back to Target – Change Control – Software Configuration Management.

MANAGING CONTRACTS 5 Hours

Managing Contracts – Types of Contracts – Stages in Contract Placement – Contract Management – Acceptance – Case Studies.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Bob Hughes, Mike Cotterell & Rajib Mall, "Software Project Management", McGraw Hill, 2012.
2. Pankaj Jalote, "Software Project Management in Practice", Addison Wesley, 2002.
3. Robert.T.Futrell, Donald F.Shafer & Linda I.Shafer, "Quality Software Project Management", Pearson Education, Asia, 2002.

P15CA*T*402 BUSINESS INTELLIGENCE

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the foundations in BI for business analysis.

CO 2: Know the data analyzing and mining techniques in BI.

CO 3: Develop skills for solving business related problems by taking intelligent decision.

Pre–requisite courses:

1. P15CA*T*301 - Data Warehousing and Data Mining

BUSINESS INTELLIGENCE (BI) **8 Hours**

Introduction – Managerial Decision Making – Computerized Support for Decision Making concept – Framework for BI – Work System View – Major Tools and Techniques.

COMPUTERIZED DECISION SUPPORT **8 Hours**

Introduction – Models – Phases of Decision Making Process – Decision Support Systems Concepts, Methodologies and Technologies.

MODELING AND ANALYSIS **9 Hours**

Management Support Systems Modeling – Structure of Mathematical Models – Management Support Systems Modeling with Spreadsheets – Mathematical Programming Optimization.

DATA WAREHOUSE **8 Hours**

Concepts – Architectures – Data Integration – Data Extraction – Transformation – Load Processes – Data Warehouse Development – Real Time Data Warehousing – Administration and Security Issues.

BUSINESS PERFORMANCE MANAGEMENT **9 Hours**

Overview – Strategize – Plan – Monitor – Act and Adjust – Performance Measurement – Methodologies – Technologies and Applications.

DATA MINING FOR BI **8 Hours**

Concepts – Applications – Process – Methods – Software Tools.

BUSINESS INTELLIGENCE IMPLEMENTATION **10 Hours**

Overview – BI Integration and Implementation – Connecting BI Systems to Databases – On–Demand BI – Issues of Legality, Privacy and Ethics.

Theory: 45 Hours **Tutorial: 15 Hours** **Total: 60 Hours**

REFERENCES

1. Efraim Turban, Ramesh Sharda & Dursun Delen, "Decision Support and Business Intelligence systems", 9th Edition, Pearson, 2013.
2. Efraim Turban, Ramesh Sharda, Dursun Delen & David Kind, "Business Intelligence, A Managerial Approach", 2nd Edition, Pearson, 2012.
3. David Loshin, "Business Intelligence, The Savvy Manager's Guide, (Morgan Kaufmann

Professionals), Atlantic Publisher, 2012.
4. Larissa T.Moss & Shaku Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle for Decision Support Applications”, Addison Wesley, 2003.

P15CA*T*403 **SERVICE ORIENTED ARCHITECTURE**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Compare different IT architecture.
CO 2: Analyze and design SOA based applications.
CO 3: Implement web service and obtain the realization of SOA.
CO 4: Implement RESTful Services.
CO 5: Design and implement SOA based Application Integration using BPEL

Pre–requisite courses:

1. P15CA*T*303 - Enterprise Application Development
2. P15CA*P*302 - J2EE Lab

INTRODUCTION TO SOA **9 Hours**

Software Architecture – Types of IT Architecture – SOA – Evolution – Key Components – Perspective of SOA – Enterprise–Wide SOA – Architecture – Enterprise Applications – Solution Architecture for Enterprise Application – Software Platforms for Enterprise Applications – Patterns for SOA – SOA Programming Models.

ANALYSIS AND DESIGN OF SOA BASED SYSTEMS **4 Hours**

Service – Oriented Analysis And Design – Design of Activity – Data – Client And Business Process Services.

TECHNOLOGIES OF SOA **5 Hours**

SOAP – WSDL – JAX – WS – XML WS for .NET – Service Integration With ESB – Scenario – Business Case for SOA – Stakeholder Objectives – Benefits of SPA – Cost Savings.

SOA GOVERNANCE **9 Hours**

SOA Implementation and Governance – Strategy – SOA Development – SOA Governance – Trends in SOA – Event–Driven Architecture – Software as a Service – SOA Technologies – Proof–of–Concept – Process Orchestration – SOA Best Practices.

SOA IMPELEMENTATION **9 Hours**

SOA using REST – Restful Services – Restful Services with and without JWS – Role of WSDL – SOAP And Java/XML Mapping in SOA – JAXB Data Binding.

SOA ARCHESTRATION **9 Hours**

JAX – WS 2.0 Client Side/Server Side Development – Packaging and Deployment of SOA Component – SOA Shopper Case Study – WSDL Centric Java WS with SOA–J – Related Software – Orchestration – BPEL – Current Trends.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Shankar Kambhampaly, "Service –Oriented Architecture for Enterprise Applications", Wiley India Pvt Ltd, 2008.
2. Mark D. Hansen, "SOA using Java Web Services", Practice Hall, 2007.
3. Waseem Roshen, "SOA–Based Enterprise Integration", Tata McGraw–HILL, 2009.

P15CA*P*401

SERVICE ORIENTED ARCHITECTURE LAB

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the concepts of SOAP, RESTful, ESB, BPEL, HTTPS and security.

CO 2: Know about integrating and building the web services.

Pre–requisite courses:

1. P15CA*T*303 - Enterprise Application Development
2. P15CA*P*302 - J2EE Lab

1. Create an application for illustrating Simple Object Access protocol based web service
2. Create an application for illustrating RESTful web service
3. Create different modules in various programming languages and wire them using ESB
4. Create a process template using web service Business Process Execution Language
5. Enable security for web service with HTTPS/SOAP
6. Enable security for web service with digital signature

P15CA*P*402 **CLOUD COMPUTING LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Identify the key elements of the cloud computing.

CO 2: Apply the knowledge of the cloud application development platform for the development of e–business systems.

CO 3: Develop an in–depth understanding of Infrastructure as a Service (IaaS),Platform as a Service (PaaS), and Software as a Service(SaaS).

Pre–requisite courses: Nil

1. Virtualization concepts in various platforms like VMware, Xen, KVM etc.
2. Cloud services like Amazon, Salesforce, Gogrid, Google
3. Android applications development using Google apps
4. Implementation procedures for private cloud like Eucalyptus, Opennebula, Rapid space
5. Implementation procedure for open source database in cloud like mongoDB
6. Implementation procedure for cloud storage
7. Application usage of office automation in cloud like word, spreadsheet, powerpoint etc.
8. Prepare a calendar for any event and share with others using Google / Yahoo calendar
9. Prepare an event management system for college symposium using cloud services
10. Prepare task / project / schedule management using cloud services
11. Implementation procedure for creating blogs, groups, working with collaborative environment
12. Social media in cloud environment
13. Installation procedure of Hadoop

SEMESTER V

P15CA*T*501 **SOFTWARE TESTING AND QUALITY ASSURANCE**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Appreciate the importance of software quality assurance.

CO 2: Apply software testing techniques for information systems development.

CO 3: Know the inputs and deliverables of the testing process.

Pre–requisite courses:

1. P15CA*T*203 - Software Engineering
2. P15CA*T*401 - Software Project Management

SOFTWARE QUALITY ASSURANCE **9 Hours**

Quality Control and Assurance – Software Process Assessment Overview – Assessment Phases – Assessment Principles – Assessment Conduct – Implementation Consideration – Quality Management – Quality Assurance Plan – Considerations – Verification and Validation.

SOFTWARE STANDARDS AND INSPECTION **9 Hours**

Definitions – Reason for Software Standards – Benefits – Establishing Standards – Guidelines – Types of Reviews – Inspection of Objectives – Basic Inspection Principles – The Conduct of Inspection – Inspection Training.

SOFTWARE TESTING FUNDAMENTALS **9 Hours**

Testing as an Organization – Bugs – Software Bugs – Reasons for Bugs – Cost of Bugs – Responsibilities of Software Tester – Software Development Process: Product Component – Life Cycle Models – Testing Realities.

REPORTING THE FINDINGS **5 Hours**

Fixing the Bugs – Isolating and Reproducing Bugs – Bug Life Cycle – Bug Tracking System – Measuring the Success – Key Performance Indicator ‘s (KPI) & Service Level Agreement’s (SLA).

TESTING TYPES **9 Hours**

Unit Testing – Integration Testing – System Testing: Performance, Load, Stress, Security, Recoverability, Compatibility Testing – Regression Testing – Installation Testing – Usability Testing – Acceptance Testing – Alpha Testing and Beta Testing – Static vs. Dynamic Testing – Manual vs. Automatic Testing – Black Box Testing – White Box Testing.

TEST DOCUMENTATION **4 Hours**

Planning your Test Effort: Goal of Planning – Planning Topics – Writing and Tracking Test Cases: Goal – Test Case Planning – Design – Cases – Procedures – Test Case Organization and Tracking – A Case Study on Test Life Cycle.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Ron Patton, "Software Testing", 2nd Edition, Pearson Education, 2009.
2. Watts S. Humphrey, "Managing the Software Process", Addison Wesley, 1999.
3. Roger Pressman S, "Software Engineering: A Practitioner's Approach", 7th Edition, McGraw Hill, 2010.
4. Elfriede Dustin, "Effective Software Testing", Pearson Education, 2007.
5. Boris Beizer, "Software Testing Techniques", Dream Tech Press, 2006.
6. William Perry, "Effective Methods for Software Testing", John–Wiley & Sons Inc, 2006.

P15CA*T*502 BIG DATA ANALYTICS

L	T	P	C
3	1	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Identify the need for big data analytics for a domain.
CO 2: Use Hadoop and Map Reduce framework.
CO 3: Apply big data analytics for a given problem.
CO 4: Suggest areas to apply big data to increase business outcome.

Pre–requisite courses:

1. P15CA*T*101 - Advanced DBMS
2. P15CA*T*301 - Data Warehousing and Data Mining

INTRODUCTION TO BIG DATA 11 Hours

Introduction to Big Data Platform – Challenges of Conventional Systems – Intelligent Data Analysis – Nature of Data – Analytic Processes and Tools – Analysis Vs Reporting – Modern Data Analytic Tools–Statistical Concepts: Sampling Distributions – Re–Sampling – Statistical Inference – Prediction Error.

MINING DATA STREAMS 11 Hours

Introduction to Streams Concepts – Stream Data Model and Architecture – Stream Computing – Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real Time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

HADOOP CONCEPTS 8 Hours

History of Hadoop – The Hadoop Distributed File System (HDFS) – Components of Hadoop – Analyzing the Data with Hadoop – Scaling Out – Hadoop Streaming – Design of HDFS – Java Interfaces to HDFS Basics.

MAP REDUCE 8 Hours

Developing a Map Reduce Application – Working of Map Reduce – Anatomy of a Map Reduce Job run – Failures – Job Scheduling – Shuffle and Sort – Task Execution – Map Reduce Types and Formats – Map Reduce Features.

HADOOP ENVIRONMENT 11 Hours

Setting up a Hadoop Cluster – Cluster Specification – Cluster Setup and Installation – Hadoop Configuration – Security in Hadoop – Administering Hadoop – Hadoop Distributed File System – Monitoring – Maintenance – Hadoop Benchmarks – Hadoop in the Cloud.

FRAMEWORKS 11 Hours

Applications on Big Data Using Pig and Hive – Data Processing Operators in Pig – Hive Services – HiveQL – Querying Data in Hive – Fundamentals of HBase and ZooKeeper – IBM Info Sphere Big

Insights and Streams – Visualizations – Visual Data Analysis Techniques, Interaction Techniques Systems and Applications

Theory: 45 Hours **Tutorial: 15 Hours** **Total: 60 Hours**

REFERENCES

1. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'reilly Media, 2012.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis & Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & Sons, 2012.
4. PeteWarden, "Big Data Glossary", O'Reilly, 2011.
5. Zikopoulos, Paul & Chris Eaton, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Tata McGraw Hill Publications, 2011.

P15CA*T*503 MANAGING TECHNICAL PEOPLE

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Analyze the importance of organization and innovative teams.

CO 2: Discuss current human resource practices and will participate in exercises designed to enhance critical skills.

CO 3: Evaluate performance, structuring teams, coaching and mentoring people, and performing the wide range of other people related duties of a manager in today's increasingly complex workplace.

CO 4: Learn a basic legal and conceptual framework for managers

Pre–requisite courses: Nil

HUMAN BEHAVIOR **9 Hours**

The Study of Human Behavior in Organizations – A Key to Career Success – Human Perception and Human Relations – Basic Principles of Human Needs and Motivations – Creating a Motivational Environment.

COMMUNICATION **3 Hours**

Understanding Communication at Work – Attitude toward Interacting with People – Inter process Communication: Being Effective.

LEADERSHIP **6 Hours**

The Driving Force: Leadership – A Leader Born or Made – Developing a Leadership Style That Works – Motivating with Compensation and Other Rewards – Technical Leadership.

MANAGING TECHNICAL AND PROFESSIONAL PEOPLE **3 Hours**

Motivating Technical and Professional People – Professional Discipline.

THE IDENTIFICATION AND DEVELOPMENT OF TALENTED PEOPLE **6 Hours**

Identifying Talented Professionals – Developing Technical Talent – Developing Managerial Talent.

INNOVATIVE TEAMS **6 Hours**

Team Structure – Managing Innovative Teams – The Innovative Team Environment – Reward and Recognition.

THE ORGANIZATION **3 Hours**

Integration and Disintegration – Managing Size – Power and Politics.

UNDERSTANDING PROGRAMMERS **9 Hours**

Programming Disciplines – Types of Programmers – Domain Expertise – Programmer Job Requirements and Abilities – Proximity and Relationship – Personality Styles – Finding and Hiring great Programmers.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Timm & Peterson, "People at Work–Human Behavior in Organizations", 5th Edition, South–Western college Publishing, 2000.
2. Humphrey "Managing Technical People: Innovation, Teamwork, and The Software Process", Pearson Education, 2009.
3. Eric Garner, "The Art of Managing People", Bookboon, 2012.
4. Mickey W. Mantle & Ron Lichty "Managing the Unmanageable: Rules, Tools, and Insights for Managing Software", 2013.

P15CA*P*501 SOFTWARE TESTING LAB

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain practical knowledge of software testing.

CO 2: Perform various testing on the applications.

CO 3: Understand the strategies for generating test plans, test cases and test documentation.

Pre–requisite courses:

1. P15CA*T*203 - Software Engineering

1. Trace and debug a C program
2. Prepare a test plan and develop test case hierarchy
3. Generate test cases and test documentation for the selected project domain
4. Perform test to collect coverage error and leak data and memory profiling data using tools like Rational Purify
5. Collect, analyze and compare the performance data using tools like Rational Quantify
6. Perform unit testing and integrated testing on the application
7. Perform load volume testing on the application
8. Perform performance testing on the application
9. Perform various testing on a web application using any open source tool

P15CA*P*502 **C#.NET LAB**

L	T	P	C
0	0	6	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Design, document, code and test small C# console and GUI applications.

CO 2: Design, document, code and unit test class libraries.

CO 3: Use an object browser and .NET documentation to examine C# and the .NET framework namespace contents.

CO 4: Use the Visual Studio IDE to create and debug application and class library solutions and projects.

Pre–requisite courses: Nil

1. Simple programs using branching and looping, arrays, strings and methods, structures, classes, objects, inheritance, polymorphism and interfaces
2. Programs to implement operator overloading, delegates, events, errors and exceptions
3. Perform string manipulation with the string builder and string classes
4. Program to implement windows forms
5. Simple application using web controls
   a) Finding factorial Value b) Currency Conversion
   c) Quadratic Equation d) Temperature Conversion e) Login control
6. Calendar control
   a) Display messages b) Display vacation
   c) Selected day using style d) Difference between two calendar dates
7. Tree view control
   a) Tree view control and data list b) operations
8. Program to implement validation controls
9. Validating form input controls using validation controls
10. Program to implement connectivity with database
11. Binding to databases using controls
12. Program to implement multiple forms, standard modules, and menus
13. Program to implement file manipulation
14. Working with XML, using Crystal Reports in web forms

ELECTIVES

P15CA*T*E11 BUSINESS PROCESS MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the concepts of business process management.
CO 2: Construct business process models for various domain.
CO 3: Apply the business process modeling techniques to solve problems.
CO 4: Understand the need for reengineering.

Pre–requisite courses: Nil

INTRODUCTION 10 Hours

Definition – Business Process Life Cycle – Classification – Goals, Structures and Organization – Traditional Application Development – Enterprise Application and their Integration – Enterprise Modeling and Process Orientation – Workflow Management – Enterprise Service Computing.

BUSINESS PROCESS MODELING FOUNDATION 12 Hours

Concept Model and Terminology – Abstraction Concept – Business Function to Business Process – Activity Model and Activity Instances – Process Model and Process Instances – Process Integration – Modeling Process Data – Modeling Organization – Modeling Operation – Business Process Flexibility.

PROCESS ORCHESTRATIONS 8 Hours

Control Flow Pattern – Petri Nets – Event Driven Process Chains – Workflow Nets – Work Flow Language – Graph Based Work Flow Language.

BUSINESS PROCESS MODELING NOTATIONS 10 Hours

Principles – Business Process Diagram – Events – Event Trigger Types – Activities – Sequence Flow and Gateways – Interacting Process – Handling Data – Message Flow – Modeling Levels.

CHOREOGRAPHIES 10 Hours

Terminology – Development Phases – Process Choreography Design – Process Choreography Implementation – Service Interaction Pattern – Work Flow Management Architectures – Web Services and their Composition.

BUSINESS PROCESS RE–ENGINEERING 10 Hours

Introduction to Business Process Re–engineering (BPR) – Meaning – Types–Process – Impetrative for Survival – Strategic Approach – Implementing Business Process Re–engineering – Methodology and Steps–Indian – BPR and Information Technology – Empowering People through IT – Case Studies.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Mathias Weske, “Business Process Management – Concepts, Languages, Architectures”, 2nd Edition, Springer, 2007.

2. Martin Keen Greg, Ackerman Islam, Azaz Manfred Haas, Richard Johnson JeeWookim & Paul Robertson, "Patterns: SOA Foundation – Business Process Management Scenario", 1st Edition, Redbooks, August 2006.
3. M. S. Jayaraman, Ganesh Natarajan, & A.V. Rangaramanujan, "Business Process Reengineering", McGraw Hill, 2001.
4. Sanjay Mohapatra, "Business Process Reengineering", 2nd Edition, Springer, 2013.

P15CA*T*E12 DISTRIBUTED OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain a clear understanding of the concepts that underlie distributed computing systems along with design and implementation issues.

CO 2: Compare and contrast various distributed operating system designs based upon resource sharing, reliability, and performance design goals.

CO 3: Examine methods that have emerged from the field of distributed operating systems in an application perspective.

Pre–requisite courses:-

1. P15CA*T*103 - Operating Systems

INTRODUCTION **3 Hours**

Distributed Computing System – Evolution – System Models – Popularity – Issues in Designing a Distributed Operating System (DOS) – Distributed Computing Environment.

MESSAGE PASSING **6 Hours**

Introduction – Desirable Features of a Good Message Passing System – Issues in Inter Process Communication (IPC) by Message Passing – Synchronization – Buffering – Multi Datagram Messages – Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication.

REMOTE PROCEDURE CALL (RPC) **9 Hours**

The RPC Model – Transparency of RPC – Implementing RPC Mechanism – Stub Generation – RPC Messages – Marshaling Arguments and Results – Server Management – Parameter – Passing Semantics – Call Semantics – Communication Protocols for RPCs – Complicated RPCs – Client–Server Binding – Exception Handling – Security – Special Types of RPCs – RPC in Heterogeneous Environments – Lightweight RPC – Optimization.

DISTRIBUTED SHARED MEMORY (DSM) **9 Hours**

Introduction – Architecture of DSM Systems – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory Space – Consistency Models – Replacement Strategy – Thrashing – Heterogeneous DSM – Advantages of DSM.

SYNCHORNIZATION AND RESOURCE MANAGEMENT **4 Hours**

Synchronization – Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms

RESOURCE MANAGEMENT **5 Hours**

Introduction – Desirable Features of a Good Global Scheduling Algorithm – Task Assignment Approach – Load Balancing Approach.

PROCESS MANAGEMENT AND DISTRIBUTED FILE SYSTEMS **9 Hours**

Process Migration – Threads – Distributed File Systems – Desirable Features of a Good Distributed File System – File Models – File Accessing Models – File Sharing Semantics – File

Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles – Case Study: Distributed Computing Environment (DCE) – Distributed File Service.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Pradeep K. Sinha, ”Distributed Operating Systems”, Prentice Hall of India, New Delhi, 2006.
2. Andrew S.Tanenbaum, “Distributed Operating Systems”, Pearson Education, New Delhi, 2008.
3. Mukesh Singhal & Niranjan G.Shivaratri, “Advanced Concepts in Operating Systems”, Tata McGraw Hill, New Delhi, 2001.

P15CA*TE*13 **CYBER SECURITY**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the basic concepts of cyber security objectives and guidelines.

CO 2: Assess a computer system's security vulnerabilities using appropriate resources.

CO 3: Be familiar with how threats to an organization are discovered, analyzed, and dealt.

Pre–requisite courses:

1. P15CA*T*202 - Computer Networks

INTRODUCTION **6 Hours**

Cyber Security – Cyber Security Policy – Domain of Cyber Security Policy – Laws and Regulations – Enterprise Policy – Technology Operations – Technology Configuration – Strategy versus Policy.

CYBER SECURITY EVOLUTION **3 Hours**

Productivity – Internet – E–commerce – Counter Measures – Challenges.

CYBER SECURITY OBJECTIVES **6 Hours**

Cyber Security Metrics – Security Management Goals – Counting Vulnerabilities – Security Frameworks – E–Commerce Systems – Industrial Control Systems – Personal Mobile Devices – Security Policy Objectives.

CYBER SECURITY GUIDANCE **6 Hours**

Guidance for Decision Makers – Tone at the Top – Policy as a Project – Cyber Security Management – Arriving at Goals – Cyber Security Documentation – The Catalog Approach – Catalog Format – Cyber Security Policy Taxonomy.

CYBER SECURITY POLICY CATALOG **9 Hours**

Cyber Governance Issues – Net Neutrality – Internet Names and Numbers – Copyright and Trademarks – Email and Messaging – Cyber User Issues – Malvertising – Impersonation – Appropriate Use – Cyber Crime – Geo Location – Privacy – Cyber Conflict Issues – Intellectual property Theft – Cyber Espionage – Cyber Sabotage – Cyber Welfare.

CYBER MANAGEMENT ISSUES **9 Hours**

Fiduciary Responsibility – Risk Management – Professional Certification – Supply Chain – Security Principles – Research and Development – Cyber Infrastructure Issue – Banking and Finance – Health Care – Industrial Control Systems.

CASE STUDY **6 Hours**

A Government's Approach to Cyber Security Policy – U.S. Federal Cyber Security Strategy – A Brief History of Cyber Security Public Policy Development in the U.S. Federal Government – The Bombing of New York's World Trade Center on February 26, 1993 – Cyber Attacks against the United States Air Force, March–May 1994 – Targeting the Pentagon – The Citibank Caper,

June –October, 1994 – How to Catch a Hacker – Murrah Federal Building, Oklahoma City – April 19, 1995 – Major Terrorism Events and their U.S. Outcomes President's Commission on Critical Infrastructure Protection -1996.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Jenifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt & Joseph Weis, "Cyber Security Policy Guidebook", John Wiley & Sons, 2012.
2. Rick Howard, "Cyber &Security Essentials", Auerbach Publications, 2011.
3. Richard A. Clarke & Robert Knake, "Cyber war: The Next Threat to National Security & What to Do About It", Eco 2010.
4. Dan Shoemaker, "Cyber Security–The Essential Body of Knowledge", 1st Edition, Cengage Learning, 2011.

P15CA*T*E14

AGENT BASED INTELLIGENT SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain more knowledge on agent based intelligence system and how to use it in Business environment.

CO 2: Understand different ways of making decision to solve various industrial problems.

CO 3: Develop an intelligent system to meet industrial needs.

Pre–requisite courses: Nil

INTRODUCTION 9 Hours

Definitions – Foundations – History – Intelligent Agents – Agents and Environments – Nature of Environments – Structure of Agents – Problem Solving – Problem Solving Agents – Searching for Solutions – Uninformed Search Strategies – Heuristic Search Strategy.

KNOWLEDGE AND REASONING 6 Hours

First Order Logic – Inference in First Order Logic – Propositional vs First Order Inference – Unification and Lifting – Forward Chaining – Backward Chaining – Resolution Strategies.

KNOWLEDGEREPRESENTATION 3 Hours

Ontological Engineering – Categories and Objects – Actions – Events.

CLASSICAL PLANNING 9 Hours

Definitions – State Space Search – Planning Graphs – Classical Planning Approaches – Time Schedule and Resources – Hierarchical Planning – Nondeterministic Domains – Multi Agent Planning.

UNCERTAIN KNOWLEDGE AND REASONING 9 Hours

Acting Under Uncertainty – Probability Notation – Inference Using Full Joint Distributions – Independence – Bayes Rule and Use – Representing Knowledge in an Uncertain Domain – Semantics of Bayesian Networks – Efficient Representation of Conditional Distributions – Exact Inference – Approximate Inference – Relational and First–order Probability Models.

DECISION MAKING 9 Hours

Making Simple Decisions – Beliefs and Desires – Utility Theory – Utility Function – Multi Attribute Utility Function – Decision Networks – The Value of Information – Decision Theoretic Expert Systems – Making Complex Decisions – Sequential Decision Problems – Value Iteration – Policy Iteration – Decisions with Multiple Agents – Mechanism Design.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Stuart Russell & Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Prentice Hall, 2009.
2. Michael Wooldridge, "An Introduction to Multi Agent System", 2nd Edition, John Wiley,

2009.
3. Patrick Henry Winston, “Artificial Intelligence”, 3rd Edition, Addison–Wesley, 1999.
4. Nils.J.Nilsson, “Principles of Artificial Intelligence”, Narosa Publishing House, 1992.

P15CA*T*E15 **MANAGEMENT INFORMATION SYSTEMS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the basic concepts and technologies used in the field of management information systems.

CO 2: Create the processes of developing and implementing information systems.

CO 3: Know the role of information systems in organizations, the strategic management processes, and the implications for the management.

Pre–requisite courses:

1. P15CA*T*101 - Advanced DBMS

SYSTEM CONCEPTS **7 Hours**

Definition – Computer Based User Machine System – Integrated System – Need for a Database – Utilization of Models – Evolution – Subsystems – Organizational Subsystems – Activities Subsystems.

ORGANIZATIONAL MODEL **4 Hours**

Basic Model – Hierarchical – Specialization – Formalization – Centralization.

ORGANISATION STRUCTURE **5 Hours**

Modifications of Basic Organizational Structure – Project Organization – Lateral Relations – Matrix Organization – Organizational Culture and Power Organizational Change.

STRUCTURE OF MIS **10 Hours**

Operating Elements – Physical Components – Processing Functions – Outputs – MIS support for Decision Making – Structured Programmable Decisions – Unstructured Non–Programmable Decisions – MIS Structure Based on Management Activity and Organizational Functions – Synthesis of MIS Structure.

SYSTEM SUPPORT **10 Hours**

Data Representation – Communication Network – Distributed Systems – Logical Data Concepts –Physical Storage Devices – File Organizations – Database Organization – Transaction Processing.

DEVELOPMENT AND MANAGEMENT **9 Hours**

A Contingency Approach to Choosing an Application – Developing Strategy – Life Cycle Definition Stage – Life & cycle Development Stage – Life & cycle Installation and Operation Stage – Project Management .

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. E.Wainright Martin, Carol V. Brown, Danial W. DeHayes, Jeffrey A. Hoffer & William C.Perkins, “Managing Information Technology”, 7th Edition, International

Edition, Prentice Hall, 2011.
2. Harold Koontz & Heinz Weihrich, "Essentials of Management", 8th Edition, Tata McGraw Hill, 2009.
3. Gordon B. Davis & Margrethe H. Olson, "Management Information Systems: Conceptual Foundations, Structure and Development", 2nd Edition, Tata McGraw Hill, 2000.

P15CA*T*E16 KNOWLEDGE MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain more knowledge on components in knowledge management.

CO 2: Explain how knowledge management systems can assist in a variety of organizational problems.

CO 3: Know different learning models in knowledge management.

CO 4: Analyze ethical and legal issues for application.

CO 5: Understand effective ways of implementing knowledge management initiatives.

Pre–requisite courses: Nil

INTRODUCTION **6 Hours**

Knowledge Management – Knowledge Organization – Need for Knowledge Management – Key Challenges – Implications for Knowledge Management – Challenges in Building Knowledge Management Systems

TYPES OF KNOWLEDGE **6 Hours**

Types of Knowledge – Data, Information and Knowledge – Expert Knowledge – Knowledge Management Life Cycle – Conventional Versus Knowledge Management Life Cycle.

KNOWLEDGE CREATION AND CAPTURE **7 Hours**

Knowledge Creation – Nonaka's Model – Knowledge Architecture – Knowledge Capture – Evaluating the Expert – Interview –Guidelines – Other Knowledge Capture Techniques.

KNOWLEDGE CODIFICATION AND SHARING **7 Hours**

Knowledge Codification – Need – Modes of Knowledge Conversion – Codifying Tacit Knowledge –Codification Tools and Procedures – Knowledge Transfer – Methods – Roles of Internet in Knowledge Sharing.

KNOWLEDGE MANAGEMENT TOOLS **5 Hours**

Learning Models – Neural Network, Association Rules, Classification Trees – Data Mining and Business Intelligence – Data Management.

KNOWLEDGE MANAGEMENT PORTALS **4 Hours**

Knowledge Management Portals – Basics – The Business Challenge – Knowledge Portal Technologies.

ISSUES IN KNOWLEDGE MANAGEMENT **5 Hours**

Ethical and Legal Issues – Knowledge Owners – Legal Issues – The Ethics Factor – Managing Knowledge Workers.

BUSINESS ROLES IN KNOWLEDGE MANAGEMENT **5 Hours**

Business Roles in Knowledge Management – Knowledge Worker Skills – Chief Knowledge Officer – Managing Knowledge Projects – Case Studies.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Elias M.Awad & Hassan Ghaziri , “Knowledge Management”, Pearson Education , 2010.
2. Irma Becerra Fernandez, Avelino Gonzalez & Rajiv Sabherwal , “Knowledge Management: Challenges, Solutions and Technologies”, Pearson Education, 2009.
3. Shelda Debowski, “Knowledge Management”, Wiley India, 2007.
4. Kimiz Dalkir, “Knowledge Management in Theory and Practice”, Butterworth–Heinemann, 2011.
5. Steven Cavaleri & Sharon Seivert with Lee W. Lee, Knowledge Leadership – The Art and Science of Knowledge based organisation, Butterworth – Heinemann, 2008.

P15CA*T*E17 ENTERPRISE RESOURCE PLANNING

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Have a sound knowledge on the basic concept of ERP and its advantage.
CO 2: Build a business model in an ERP package.
CO 3: Understand the advantages of the ERP solution.
CO 4: Be aware of the various commercial ERP packages.

Pre–requisite courses: Nil

INTRODUCTION TO ERP 4 Hours

Integrated Management Information Seamless Integration – Supply Chain Management – Integrated Data Model – Benefits of ERP

BUSINESS ENGINEERING 5 Hours

Business Engineering and ERP – Definition of Business Engineering – Principle of Business Engineering – Business Engineering with Information Technology.

BUSINESS MODELLING FOR ERP 9 Hours

Building the Business Model – ERP Implementation – An Overview – Role of Consultant, Vendors and Users – Customization – Precautions – ERP Post Implementation Options – ERP Implementation Technology – Guidelines for ERP Implementation.

ERP AND THE COMPETITIVE ADVANTAGE 9 Hours

ERP domain Manufacturing (MFG)/Pro – Industrial and Financial Systems (IFS)/Avalon – Industrial and Financial Systems – Baan IV, Systems Applications and Products (SAP) – Market Dynamics and Dynamic Strategy.

COMMERCIAL ERP PACKAGE 9 Hours

Description – Multi–Client/Server Solution – Open Technology – User Interface – Application Integration.

ARCHITECTURE 9 Hours

Basic Architectural Concepts – The System Control Interfaces – Services – Presentation Interface – Database Interface.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Vinod Kumar Garg & N.K.Venkita Krishnan, “Enterprise Resource Planning – Concepts and Practice”, PHI Learning Pvt. Ltd., 2004.
2. Jose Antonio Fernandz, “The SAP R/3 Handbook”, TMH, 2005.

P15CA*T*E21 **CRYPTOGRAPHY AND NETWORK SECURITY**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain knowledge on encryption techniques, design principles and modes of operation.
CO 2: Design a security solution for a given application.
CO 3: Examine the issues and structure of authentication service and electronic mail security.
CO 4: Understand Intrusion detection and firewall design principles.

Pre–requisite courses:

1. P15CA*T*202 - Computer Networks

SYMMETRIC CIPHERS **9 Hours**

Overview – Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard – Introduction to Finite Fields – Advanced Encryption Standard – More on Symmetric Ciphers – Confidentiality using Symmetric Encryption.

PUBLIC KEY ENCRYPTION AND HASH FUNCTIONS **5 Hours**

Introduction to Number Theory – Public Key Cryptography and RSA – Key Management – Diffie – Hellman Key Exchange – Elliptic Curve Cryptography.

AUTHORIZATION **4 Hours**

Message Authentication and Hash Functions – Hash and MAC Algorithms – Digital Signatures and Authentication Protocols.

NETWORK SECURITY PRACTICE **9 Hours**

Authentication Applications – Kerberos – X.509 Authentication Service – Electronic Mail Security – Pretty Good Privacy – S/MIME – IP Security – Web Security.

SYSTEM SECURITY **5 Hours**

Intruders – Intrusion Detection – Password Management – Malicious Software – Viruses and Related Threats – Viruses Counter Measures – Distributed Denial of Service Attacks.

FIREWALL **4 Hours**

Firewalls – Firewall Design Principles – Trusted Systems.

WIRELESS SECURITY **9 Hours**

Introduction to Wireless LAN Security Standards – Technology Comparisons – Wireless LAN Security Factors – Issues in Wireless Security.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. William Stallings, "Cryptography and Network Security – Principles and Practices", 5th Edition, Pearson Education, 2010.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill, 2009.
3. Stewart S. Miller, "Wi–Fi Security", Tata McGraw Hill 2003.

4. Charles B. Pfleeger & Shari Lawrence Pfleeger, “Security in Computing”, 4th Edition, Pearson Education, 2007.

P15CA*T*E22 DISTRIBUTED COMPUTING

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain a clear understanding of the concepts that underlie distributed computing systems along with design and implementation issues.

CO 2: Understand the key mechanisms and models for distributed systems.

CO 3: Learn how to use and deploy distributed algorithms for distributed services.

Pre–requisite courses:

1. P15CA*T*202 - Computer Networks
2. P15CA*T*102 - Operating Systems

INTRODUCTION **8 Hours**

Characterization of Distributed Systems – Examples – Focus on Resource Sharing – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols.

DISTRIBUTED PROCESS **5 Hours**

Inter process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Multicast Communication – Network Virtualization.

DISTRIBUTED OBJECTS **4 Hours**

Remote Invocation – Request Reply Protocols – Remote Procedure Call – Remote Method Invocation.

OPERATING SYSTEM ISSUES–I **9 Hours**

The Operating System Layer – Protection – Processes and Threads – Communication and Invocation – Operating System Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Distributed File Systems – File Service Architecture – Sun Network File System.

OPERATING SYSTEM ISSUES–II **9 Hours**

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – Directory Service – Clocks, Events and Process States – Synchronizing Physical Clocks – Logical Time and Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Consensus and Related Problems.

DISTRIBUTED TRANSACTIONS **5 Hours**

Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols.

CONCURRENCY CONTROL **5 Hours**

Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Distributed Multimedia Systems.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Sunita Mahajan & Seema Shah, "Distributed Computing", 2nd Edition, Oxford University Press, 2013.
2. George Coulouris, Jean Dollimore, Tim Kindberg & Gordon Blair, "Distributed Systems Concepts and Design", 5th Edition, Pearson Education, 2012.
3. Andrew S.Tanenbaum, "Distributed Operating Systems", Pearson Education, 2009.
4. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Education, 2004.
5. MugeshSinghal & Niranjan G Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill Edition, 2001.

P15CA*T*E23 **CLOUD COMPUTING**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Articulate the main concepts
CO 2: Identify the architecture
CO 3: Explain the core issues of cloud computing such as security
CO 4: Choose the appropriate technologies

Pre–requisite courses: Nil

UNDERSTANDING CLOUD COMPUTING **8 Hours**

Cloud Computing – History of cloud computing – Cloud Architecture – Cloud Storage – Need for Cloud Computing – Advantages and Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

DEVELOPING CLOUDSERVICES **8 Hours**

Web–Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service (SaaS) – Platform as a Service (PaaS) – Web Services – On Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

USING CLOUD SERVICES **8 Hours**

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management.

COLLABORATING ON CONTACT MANAGEMENT **5 Hours**

Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files.

OUTSIDE THE CLOUD **9 Hours**

Evaluating Web Mail Services – Evaluating Instant Messaging – Evaluating Web Conference Tools – Creating Groups on Social Networks – Evaluating on Line Groupware – Collaborating via Blogs and Wikis.

STORING AND SHARING **7 Hours**

Understanding Cloud Storage – Evaluating Online File Storage – Exploring Online Book Marking Services – Exploring Online Photo Editing Applications – Exploring Photo Sharing Communities – Controlling it with Web Based Desktops.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Michael Miller, “Cloud Computing”, Pearson Education, New Delhi, 2012.
2. Kai Hwang, Geoffrey C Fox & Jack G Dongarra, “Distributed and Cloud Computing –

From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse & James F.Ransome, "Cloud Computing: Implementation Management, and Security", CRC Press, 2010.
4. Toby Velte, Anthony Velte & Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud", O'Reilly, 2009.

P15CATE24 ELECTRONIC COMMERCE

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understanding the differences between E–Commerce and traditional commerce.

CO 2: Analyze and compare the different monetary transactions.

CO 3: Propose a traditional business idea and work on converting it to E–Commerce.

CO 4: Implement an E–Commerce sample site.

Pre–requisite courses: Nil

INTRODUCTION 5 Hours

Introduction to Electronic Commerce: Electronic Commerce: The Second Wave – Business Models – Revenue Models and Business Processes – Economic Forces and Electronic Commerce – Identifying Electronic Commerce Opportunities – International Nature of Electronic Commerce.

ENVIRONMENT OF ELECTRONIC COMMERCE 4 Hours

Legal, Ethical, and Tax Issues: The Legal Environment of Electronic Commerce – Use and Protection of Intellectual Property in Online Business – Online Crime, Terrorism and Welfare – Ethical Issues – Taxation and Electronic Commerce.

COMMERCE ON WEB 9 Hours

Selling on the Web: Revenue Models – Revenue Models in Transition – Revenue Strategy Issues – Creating an Effective Web Presence – Web Site Usability – Connecting with Customers – Marketing on the Web: Web Marketing Strategies – Communicating with Different Market Segments – Beyond Market Segmentation: Customer Behavior and Relationship Intensity – Advertising on the Web – E–Mail Marketing – Technology Enabled Customer Relationship Management – Creating and Maintaining Brands on the Web – Search Engine Positioning and Domain Names.

BUSINESS STRATEGIES 9 Hours

Business–to–Business Online Strategies: Purchasing, Logistics and Support Activities – Electronic Data Interchange – Supply Chain Management using Internet Technologies – Electronic Market Places and Portals – Online Auctions, Virtual Communities and Web portals: Auction Overview – Online Auctions and Related Businesses – Virtual Communities: Web Portals and Social Networks.

SECURITY 5 Hours

Electronic Commerce Security: Online Security Issues Overview – Security for Client Computers –Communication Channel Security – Security for Server Computers – Organizations that Promote Computer Security.

WEB SERVER HARDWARE AND SOFTWARE 4 Hours

Web Server Basics – Software for Web Servers – Electronic Mail – Web Site and Internet Utility Programs – Web Server Hardware.

PAYMENT SYSTEMS **9 Hours**

Payment Systems for Electronic Commerce: Online Payment Basics – Payment Cards – Electronic Cash – Electronic Wallets – Stored–Value Cards – Internet Technologies and the Banking Industry. Case Studies: E–Commerce Web Sites.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Gary P.Schneider, "Electronic Commerce", 8th Edition, Cengage Learning India Private Limited, New Delhi, 2009.
2. Kenneth C.Laudon & Carol Guercio Traver, "E–Commerce – Business, Technology & Society", Pearson Education, 2008.
3. Dave Chaffey, "E–Business and E–Commerce Management", 4th Edition, Pearson Education, 2011.

P15CATE25 INFORMATION RETRIEVAL

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the principles of predictive analytics to achieve real and pragmatic solutions.
CO 2: Explain Information retrieval system strategies.
CO 3: Compare various types of retrieval utilities.
CO 4: Apply cross–language information retrieval strategies.
CO 5: Identify various steps involved in information retrieval techniques.

Pre–requisite courses: Nil

RETRIEVAL STRATEGIES **8 Hours**

Vector Space Model – Probabilistic Retrieval Strategies – Language Models – Inference Networks – Extended Boolean Retrieval – Latent Semantic Indexing – Neural Networks – Genetic Algorithms – Fuzzy Set Retrieval.

RETRIEVAL UTILITIES **8 Hours**

Relevance Feedback – Clustering – Passage – Based Retrieval – N–grams – Regression Analysis – Thesauri – Semantic Networks – Parsing.

CROSS–LANGUAGE INFORMATION RETRIEVAL **8 Hours**

Introduction – Crossing the Language Barrier – Cross–Language Retrieval Strategies – Cross Language Utilities – Efficiency – Inverted Index – Query Processing – Signature Files – Duplicate Document Detection.

INTEGRATING STRUCTURED DATA AND TEXT **7 Hours**

Relational Model – Historical Progression – Relational Application – Semi–Structured Search – Multi–dimensional Data Model – Mediators.

PARALLEL INFORMATION RETRIEVAL **7 Hours**

Parallel Text Scanning – Parallel Indexing – Clustering and Classification – Parallel Systems.

DISTRIBUTED INFORMATION RETRIEVAL **7 Hours**

Theoretical Model – Web Search – Result Fusion – Peer–to–Peer Information Systems – Architectures.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. David A. Grossman & Ophir Frieder, "Information Retrieval: Algorithms, and Heuristics", 2nd Edition, Academic Press, 2008.
2. Christopher D. Manning, Prabhakar Raghavan & Hinrich Schütze, "An Introduction to Information Retrieval", Cambridge University Press, Cambridge, England, 2009.
3. Ricardo Baeza–Yate & Berthier Ribeiro–Neto, "Modern Information Retrieval", Pearson Education Asia, 2007.

4. G.G. Chowdhury, “Introduction to Modern Information Retrieval”, 3rd Edition, Neal–Schuman Publishers, 2010.
5. Daniel Jurafsky & James H. Martin, “Speech and Language Processing 2/E”, Pearson Education, 2009.
6. Charles T. Meadow, Bert R. Boyce & Donald H. Kraft, “Text Information Retrieval Systems”, 3rd Edition, Academic Press, 2007.

P15CA*T*E26 **RUBY PROGRAMMING**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Use the language, components and tools for developing Ruby applications.
CO 2: Understand Ruby and its world, along with their interoperability.
CO 3: Understand the big picture of Ruby inter–activeness.

Pre–requisite courses: Nil

INTRODUCTION TO RUBY **9 Hours**

Ruby – An Introduction to Numbers – Strings – Properties and Methods – Conversions – Arrays – Variables and More Methods – Printing – Brackets and String Manipulation.

OOPS IN RUBY **9 Hours**

New in Ruby – Classes – Objects and Variables – Containers – Blocks and Iterators – Standard Types – Expressions – Exceptions – Catch and Throw – Modules – Basic Input and Output – Threads and Processes.

RUBY AND ITS WORLD **9 Hours**

Ruby and Its World – Ruby and the Web – Ruby Tk – Ruby and Microsoft Windows – Extending Ruby.

AVAILABLE RUBY LIBRARIES **9 Hours**

Locking Ruby in the Safe – Reflection – Object Space – Distributed Ruby – Built–in Classes and Methods – Standard Library.

RUBY LIBRARIES **5 Hours**

Object–Oriented Design Libraries – Network and Web Libraries.

INTERACTIVE RUBY **4 Hours**

Microsoft Windows Support – Embedded Documentation – Interactive Ruby Shell – Support.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Dave Thomas, Andy Hunt & Chad Fowler, "Programming Ruby 1.9 & 2.0: The Pragmatic Programmers' Guide", 4th Edition, Pragmatic Bookshelf, 2013.
2. David Flanagan & Yukihiro Matsumoto, "The Ruby Programming Language", O'Reilly Media, 2010.
3. Jay McGavren, "Head First Ruby", O'Reilly Media, 2014.

P15CA*T*E27 **WEB MINING**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Build a sample search engine using available open source tools.

CO 2: Identify the different components of a web page that can be used for mining apply machine learning concepts to web content mining.

CO 3: Implement page ranking algorithm and modify the algorithm for mining information process data using the map reduce paradigm.

CO 4: Design a system to harvest information available on the web to build recommender systems analyze social media data using appropriate data/web mining techniques.

CO 5: Modify an existing search engine to make it personalized.

Pre–requisite courses:

1. P15CA*T*301 - Data Warehousing and Data Mining

INTRODUCTION **8 Hours**

Introduction – Web Mining – Theoretical Background – Algorithms and Techniques – Association Rule Mining – Sequential Pattern Mining –Information Retrieval and Web Search – Information Retrieval Models – Relevance Feedback– Text and Web Page Pre–processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta–Search – Web Spamming.

WEB CONTENT MINING **10 Hours**

Web Content Mining – Supervised Learning – Decision tree – Naïve Bayesian Text Classification – Support Vector Machines – Ensemble of Classifiers Unsupervised Learning – K–means Clustering – Hierarchical Clustering – Partially Supervised Learning – Markov Models – Probability – Based Clustering – Evaluating Classification and Clustering – Vector Space Model – Latent Semantic Indexing – Automatic Topic Extraction – Opinion Mining and Sentiment Analysis – Document Sentiment Classification.

WEB LINK MINING **5 Hours**

Web Link Mining – Hyperlink based Ranking – Introduction – Social Networks Analysis – Co–Citation and Bibliographic Coupling – Page Rank – Authorities and Hubs – Link–Based Similarity Search – Enhanced Techniques for Page Ranking – Community Discovery.

WEB CRAWLING **4 Hours**

Web Crawling – A Basic Crawler Algorithm – Implementation Issues – Universal Crawlers – Focused Crawlers – Topical Crawlers – Evaluation – Crawler Ethics and Conflicts – New Developments.

STRUCTURED DATA EXTRACTION **8 Hours**

Structured Data Extraction: Wrapper Generation – Preliminaries– Wrapper Induction– Instance – Based Wrapper Learning – Automatic Wrapper Generation: Problems – String Matching and Tree Matching – Multiple Alignment – Building DOM Trees – Extraction Based on a Single List Page and Multiple Pages – Introduction to Schema Matching – Schema – Level Match – Domain

and Instance – Level Matching – Extracting and Analyzing Web Social Networks.

WEB USAGE MINING **5 Hours**

Web Usage Mining – Click stream Analysis – Web Server Log Files – Data Collection and Pre–Processing – Cleaning and Filtering – Data Modeling for Web Usage Mining – The BIRCH Clustering Algorithm – Affinity Analysis and the Apriori Algorithm – Binning.

DISCOVERY AND ANALYSIS **5 Hours**

Discovery and Analysis of Web Usage Patterns – Modeling user Interests – Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model – Applications – Collaborative Filtering – Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDA Models.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Bing Liu, "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data–Centric Systems and Applications)", 2nd Edition, Springer; 2009.
2. Guandong Xu, Yanchun Zhang & Lin Li, "Web Mining and Social Networking: Techniques and Applications", 1st Edition, Springer, 2010.
3. Zdravko Markov & Daniel T. Larose, "Data Mining the Web: Uncovering Patterns in Web Content, Structure, and Usage", John Wiley & Sons Inc., 2007.
4. Soumen Chakrabarti, "Mining the Web: Discovering Knowledge from Hypertext Data", Morgan Kaufmann, 2002.
5. Adam Schenker, "Graph–Theoretic Techniques for Web Content Mining", World Scientific Pub Co Inc, 2005.
6. Min Song, Yi Fang & Brook Wu, "Handbook of Research on Text and Web Mining Technologies", IGI Publishing, 2008.

P15CA*T*E31 **UNIX INTERNALS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the internals of Unix operating system.

CO 2: Become familiar with file organization and system calls.

CO 3: Understand about memory management; inter process communication and multi processor systems.

Pre–requisite courses:

1. P15CA*T*102 - Operating Systems

INTRODUCTION TO UNIX **5 Hours**

Unix Operating System – History – System Structure – Users Perspective – Operating System Services – Hardware – Architecture – System Concepts – Kernel Data Structures – System Administration.

BUFFER CACHE **4 Hours**

Buffer Cache – Headers – Structure of the Buffer Pool – Scenarios – Reading and Writing Disk Blocks – Advantages and Disadvantages of the Buffer Cache.

FILE SYSTEMS **9 Hours**

INODES – Structure of a Regular File – Directories – Conversion of a Path Name to an INODE – Super Block – INODE Assignment – Disk Blocks – System Calls for the File System.

PROCESSES **4 Hours**

Process States and Transitions – Layout of System Memory – Context of a Process – Manipulation of the Process Address Space – Sleep.

PROCESS CONTROL, PROCESS SCHEDULING AND TIME **5 Hours**

Process Control – Creation – Signals – Awaiting Process Termination – The Shell – System Boot and Init Process – Process Scheduling and Time – System Calls for Time – Clock.

MEMORY MANAGEMENT **9 Hours**

Swapping – Demand Paging – Driver Interfaces – Disk Drivers – Terminal Drivers – Streams.

INTERPROCESS COMMUNICATION **4 Hours**

Process Tracing – System V IPC – Network Communications – Sockets.

MULTIPROCESSOR SYSTEMS **5 Hours**

Problem of Multiprocessor Systems – Solution with Master and Slave Processors – Semaphores – Distributed Unix Systems – Satellite Processors – Newcastle Connection – Transparent Distributed File Systems – System Calls.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Bach M.J, “The Design of the Unix Operating System”, Prentice Hall of India Learning Pvt. Ltd., 2011.
2. Goodheart B. & Cox.J., “The Magic Garden Explained”, Prentice Hall India, 1994.
3. Leffler S.J., Mckusick M.K., Karels M.J & Quarterman J.S., “The Design and Implementationof the 4.3 BSD Unix Operating System”, Addison Wesley, 1998.

P15CATE32 DATA VISUALIZATION

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain more knowledge on data visualization.

CO 2: Understand the need for data visualization in the organization.

CO 3: Analyze and choose the appropriate business data set for the problem.

CO 4: Apply the Extract Clean Transform Load (ECTL) procedures and choose right data visualization tool for the problem.

Pre–requisite courses:-

1. P15CA*T*301 - Data Warehousing and Data Mining

DATA VISUALIZATION **7 Hours**

Visualization Data Sets – Visualization Data Types – Visual Vs Data Dimensions – Data Visualization Tools – Multidimensional Data Visualization Tools – Hierarchical and Landscape Data Visualization Tools.

JUSTIFYING AND PLANNING THE DATA VISUALIZATION **6 Hours**

Classes of Projects – Project Justifications – Closed Loop Business Model – Project Resources and Roles – Case Study.

IDENTIFYING THE TOP BUSINESS QUESTIONS **6 Hours**

Choosing the Top Business Questions – Data Visualization Problem Definitions – Visual Data Mining Problem Definitions – Case Study.

CHOOSING THE BUSINESS DATA SET **6 Hours**

Identifying the Operational Data – Selecting Columns from the Operational Data Sources – Developing and Documenting the Extract Clean Transform Load (ECTL) Procedures – Case Study.

TRANSFORMING THE BUSINESS DATA SET **6 Hours**

Types of Logical Transformations – Verify the Business Data Set – Verification Process – Case Study.

CHOOSING THE VISUALIZATION **8 Hours**

Choosing the Right Data Visualization Tool – Choosing the Right Data Mining Tool – Case Study – Analyzing the Data Visualizations – Analyzing the Data Mining Models – Case Study.

VERIFYING AND PRESENTING THE VISUALIZATION **6 Hours**

Verifying the Data Visualization and Mining Models – Organizing and Creating the Business Presentation – Case Study.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Tom Sokup & Ian Davidson, “Visual Data Mining: Techniques and Tools for Data

Visualization and Mining", 2nd Edition, Wiley, 2007.
2. Andy Kirk, "Data Visualization: A Successful Design Process", 1st Edition, Pearson, 2012.
3. Alexandru C.Telea, "Data Visualization: Principles and Practice", 3rd Edition, Pearson, 2007.
4. Ben Fry, "Visualizing Data: Exploring and Explaining Data with Processing Environment", 1st Edition, O'Reilly Media, 2008.
5. Bill Ferster & Ben Shneiderman, "Interactive Visualization – Insight through Inquiry", 2nd Edition, Addison Wesley, 2013.

P15CA*T*E33

INFORMATION SYSTEM METHODOLOGIES

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Use DSS, KMS, Data Warehousing, Intranets, Testing, E– Business and E–Governance.
CO 2: Understand the technical aspect of telecommunication systems and internet as well as their roles in business environment.
CO 3: Become familiar database concepts and structures.
CO 4: Appreciate the trends, ethical, security, and globalization issues in information technology.

Pre–requisite courses:

1. P15CA*T304* - Object Oriented Analysis and Design
2. P15CA*T*101 - Advanced DBMS

INTRODUCTION 9 Hours

Data – Information – Intelligence – Information Technology – Information System – Evolution – Types based on Functions and Hierarchy – Functional Information Systems – DSS(Decision Support System) – EIS(Executive Information System) – KMS (*Knowledge Management System*) – GIS (Geographic Information System) – International Information System.

SYSTEMS ANALYSIS AND DESIGN 9 Hours

System Development Methodologies – System Analysis and Design Tools – System Flow Chart – Decision Table – DFD (Data Flow Diagram) – ER (Entity Relation) – Object Oriented Analysis and Design – UML (Unified Modeling Language) Diagrams.

DATABASE MANAGEMENT SYSTEMS 9 Hours

DBMS (Database Management System) – HDBMS (Hierarchical Data Base Management System) – NDBMS (Network Database Management System) – RDBMS (Relational Database Management System) – OODBMS (Object Oriented Database Management System) – Query Processing – SQL(Structured Query Language) – Concurrency Management – Data Warehousing and Data Mart.

SECURITY 5 Hours

Security – Testing – Error Detection – Controls – IS(Information System) Vulnerability – Disaster Management – Computer Crime – Securing the Web.

CONTROL AND REPORTING 4 Hours

Intranets and Wireless Network – Software Audit – Ethics in IT – User Interface and Reporting.

NEW IT INITIATIVES 4 Hours

Role of Information Management in ER – E– Business – E–Governance.

MINING 5 Hours

Data Mining – Business Intelligence – Pervasive Computing – Cloud computing – CMM (Capability Maturity Model).

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. E.Wainright Martin, Carol V. Brown, Danial W. DeHayes, Jeffrey A. Hoffer & William Robert Schultheis & Mary Summer, "Management Information Systems – The Managers View", Tata McGraw Hill, 2008.
2. Kenneth C. Laudon & Jane Price Laudon, "Management Information Systems – Managing the Digital Firm", PHI Learning / Pearson Education, PHI, Asia, 2002.
3. Gordon Davis, "Management Information System: Conceptual Foundations, Structure and Development", 7th edition, Tata McGraw Hill, 2006.
4. Haag, Cummings & McCubbrey, "Management Information Systems for the Information Age", McGraw Hill, 2012.

P15CA*T*E34 OPEN SOURCE TECHNOLOGIES

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Understand open domain standards.

CO2: Work and develop projects with popular open source software tools.

Pre–requisite courses: Nil

INTRODUCTION 9 Hours

Introduction to Open Sources – Need of Open Sources – Advantages of Open Sources – Application of Open Source – Open Source Operating Systems : Linux – Introduction – General Overview – Kernel Mode and User Mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux .

OPEN SOURCE DATABASE 9 Hours

Introduction to MySQL – Setting up Account – Starting, Terminating and Writing SQL Programs – Record Selection Technology – Working with Strings – Date and Time – Sorting Query Results –Generating Summary – Working with Metadata – Using Sequences – My SQL and Web.

OPEN SOURCE PROGRAMMING LANGUAGES 9 Hours

Introduction to PHP Hypertext Processor(PHP) – Programming in Web Environment – Variables – Constants – Data Type – Operators – Statements – Functions – Arrays – Object Oriented Programming (OOP) – String Manipulation and Regular Expression – File Handling and Data Storage – PHP and SQL Database – PHP and Lightweight Directory Access Protocol (LDAP) – PHP Hypertext Processor (PHP) Connectivity – Sending and Receiving E–mails – Debugging and Error Handling – Security – Templates.

PYTHON 9 Hours

Introduction to Python – Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditional and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment .

PERL 9 Hours

Perl Backgrounder **–** Perl Overview – Perl Parsing Rules – Variables and Data – Statements and Control Structures – Subroutines, Packages and Modules – Working with Files – Data Manipulation.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata MCGraw Hill, Indian Reprint 2009.
2. VikramVaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata MCGraw Hill, Indian Reprint, 2009.
3. Remycard, Eric Dumas & Frank Mevel, “The Linux Kernel Book”, Wiley Publications,

2003.
4. Steve Suchring, “MySQL Bible”, John Wiley, 2002.
5. Rasmus Lerdorf & Levin Tatroe, “Programming PHP”, O’Reilly, 2002.
6. Wesley J.Chun , “ Core Phython Programming ”, Prentice Hall, 2001.
7. Martin C.Brown, “Perl : The Complete Reference”, 2nd Edition, Tata McGraw Hill, Indian Reprint, 2009.

P15CA*T*E35 **SEMANTIC WEB**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Compare conventional web with semantic web.
CO 2: Analyze and design semantic knowledge representation modes.
CO 3: Construct ontology using different tools.
CO 4: Use semantic web services with web applications.

Pre–requisite courses: Nil

INTRODUCTION **9 Hours**

The Future of the Internet: Introduction – The Syntactic Web – The Semantic Web Ontology in Computer Science – Defining the Term Ontology – Differences among Taxonomies – Thesauri – and Ontologies, Classifying Ontologies – Web Ontologies, Web Ontology Description Languages – Ontology – Categories – and Intelligence.

SEMANTIC KNOWLEDGE REPRESENTATION **4 Hours**

Knowledge Representation in Description Logic – Introduction – An Informal Example – The Family of Attributive Languages – Inference Problems.

RESOURCE DESCRIPTION FRAMEWORK (RDF) AND RDF SCHEMA **4 Hours**

Introduction – XML Essentials – RDF – RDF Schema – A Summary of the RDF/RDF Schema Vocabulary.

WEB ONTOLOGY LANGUAGE **6 Hours**

Introduction – Requirements for Web Ontology Description Languages – Header Information Versioning – Annotation Properties – Properties – Classes– Individuals – Data Types – A Summary of the OWL Vocabulary.

RULE LANGUAGES **6 Hours**

Rule Languages – Introduction – Usage Scenarios for Rule Languages – Datalog – RuleML – Semantic Web Rule Language(SWRL) – TRIPLE Semantic Web Services– Web Service Essentials – OWL–S Service Ontology – An OWL–S Example.

ONTOLOGY DEVELOPMENT **6 Hours**

Methods for Ontology Development – Introduction – Use hold and King Ontology Development Method – Toronto Virtual Enterprise Method – Meth ontology – KACTUS Project Ontology Development Method – Lexicon – Based Ontology Development Method – Simplified Methods Ontology Sources – Metadata – Upper Ontologies – Other Ontologic of Interest – Ontology Libraries.

SOFTWARE TOOLS **6 Hours**

Semantic Web Software Tools – Introduction – Metadata and Ontology Editors – Reasoners – Other tools. Software Agents – Introduction – Agent Forms – Agent Architecture – Agents in the Semantic web Context. Semantic Desktop – Semantic Desktop Metadata – Semantic Desktop

Ontologies – Semantic Desktop Architecture – Semantic Desktop Related Applications.

ONTOLOGY APPLICATION IN ART **4 Hours**

Introduction – Ontologies for the Description of Works of Art – Metadata Schemas for the Description of Works of Art – Semantic Annotation of Art Images.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Karin K. Breitman, Marco Antonio Casanova & Walter Truszowski, "Semantic Web Concepts: Technologies and Applications", Springer 2007.
2. Heiner Stuckenschmidt & Frank Van Harmelen, "Information Sharing on the Semantic Web", Springer, 2006.
3. Grigoris Antoniou & Frank Van, "Semantic Web Primer", 2012.
4. Rudi Studer, Stephan Grimm & Andrees Abeker, "Semantic Web Services: Concepts, Technologies and Applications", Springer, 2007.
5. John Davis, Dieter Fensal, Frank Van Harmelen & J. Wiley, "Towards the Semantic Web: Ontology Driven Knowledge Management", 2002.

P15CA*T*E36 DIGITAL IMAGE PROCESSING

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Implement basic image processing algorithms.

CO 2: Design an application that incorporates different concepts of image processing.

CO 3: Apply and explore new techniques in the areas of image enhancement, restoration, segmentation and compression.

CO 4: Critically analyze different approaches to implement mini projects.

Pre–requisite courses: Nil

DIGITAL IMAGE FUNDAMENTALS **9 Hours**

Digital Image Processing – Introduction – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Basic Relationships between Pixels.

IMAGE ENHANCEMENT **5 Hours**

Histogram Processing – Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters – Frequency Domain Filtering – Smoothing Frequency Domain Filters – Sharpening Frequency Domain Filters.

IMAGE RESTORATION **5 Hours**

Image Restoration and Degradation Process – Noise Models – Restoration using Spatial Filtering and Frequency Domain Filtering.

IMAGE COMPRESSION **5 Hours**

Fundamentals – Compression Models – Compression Methods – Huffman Coding – Golomb Coding – Arithmetic Coding – LZW Coding – Run Length Coding.

MORPHOLOGY **4 Hours**

Erosion and Dilation – Opening and Closing – Morphological Algorithms – Boundary Extraction – Hole Filling – Extraction of Connected Components – Convex Hull – Gray–Scale Morphology.

SEGMENTATION **5 Hours**

Fundamentals – Point, Line and Edge Detection – Thresholding – Region Based Segmentation.

REPRESENTATION AND DESCRIPTION **6 Hours**

Representation schemes – Boundary descriptors – Regional descriptors – Relational Descriptors

OBJECT RECOGNITION **6 Hours**

Patterns and Pattern Classes – Recognition Based on Decision – Theoretic Methods – Structural Methods.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Rafael C. Gonzalez & Richard E. Woods, "Digital Image Processing", 3rd Edition, Prentice Hall, 2012.

2. Anil Jain.K, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 1988.
3. Milan Sonka, Vaclav Hlavac & Roger Boyle, “Image Processing, Analysis, and Machine Vision”, 4th Edition, Vikas Publishing House, 2014.

P15CA*T*E37 HUMAN COMPUTER INTERACTION

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain more knowledge on user interface.

CO 2: Understand the purpose of screen designing.

CO 3: Apply the different menu formats for creating the interface.

Pre–requisite courses: Nil

INTRODUCTION 7 Hours

Introduction – Importance of User Interface – Definition – Importance of Good Design – Benefits of Good Design – History of Human – Computer Interface.

GRAPHICAL AND WEB USER INTERFACE 6 Hours

Graphical User Interface – Popularity of Graphics – Concept of Direct Manipulation, Graphical Systems and Characteristics – Web User Interface – Popularity and Characteristics – Principles of User Interface – Design Process.

HUMAN INTERACTION WITH COMPUTERS 4 Hours

Human Interaction with Computers – Important Human Characteristics in Design – Human Considerations in Design – Human Interaction Speeds and Understanding the Business Function.

SCREEN DESIGNING 10 Hours

Human Considerations in Interface and Screen Design – Interface Design Goals – Screen Meaning and Purpose – Organizing Screen Elements – Ordering of Data and Content – Navigation and Flow – Visually Pleasing Composition – Focus and Emphasis – Presentation Information and Statistical Graphics – Technological Consideration in Interface Design.

MENUS AND NAVIGATION SCHEMES 9 Hours

Structure of Menus – Functions – Content – Formatting – Web Site Navigation – Problems – Goals and Design – Kinds of Graphical Menus – Menu Bar – Pull Down Menu – Cascading Menu – Pop–Up Menu – Tear–Off Menu – Iconic and Pie Menus.

WINDOWS AND GRAPHICS 9 Hours

Window Characteristics – Components of a Window – Meaningful Graphics, Icons and Images – Icons – Kinds, Characteristics – Creating Icon – Drawing Icon – Design Process – Screen Presentation – Multimedia – Graphics –Images, Pictures, Video and Animation.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Wilbert O Galitz, "The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques", 3rd Edition, Wiley Dream Tech, 2007.
2. Alan Dix, Janet Fincay, Gre Goryd Abowd & Russell Bealg, "Human –Computer Interaction", 3rd Edition, Pearson Education, 2004.

3. Sharp, Rogers & Preece, “Interaction Design”, 2nd Edition, John Wiley, 2008.
4. John M.Caroli, “Human–Computer Interaction–In the New Millennium”, Pearson Education, 2007.
5. Soren Lauesen, “User Interface Design – A Software Engineering Perspective”, Addison–Wesley, 2005.

P15CA*T*E38 **MOBILE COMPUTING**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the principles of mobile computing technologies.

CO 2: Identify different applications that mobile computing offers to people, employees, and businesses.

CO 3: Understand the possible future of mobile computing technologies and applications.

Pre–requisite courses: Nil

INTRODUCTION **9 Hours**

Medium Access Control: Motivation for Specialized MAC – SDMA – FDMA – TDMA – CDMA – Comparison of Access Mechanisms – Tele Communications: GSM – DECT – TETRA – UMTS – IMT – 200–Satellite Systems: Basics – Routing – Localization – Handover – Broadcast Systems: Overview – Cyclic Repetition of Data – Digital Audio Broadcasting – Digital Video Broadcasting.

WIRELESS NETWORKS **9 Hours**

Wireless LAN: Infrared vs Radio Transmission – Infrastructure Networks – Ad hoc Networks – IEEE 802.11 – HIPERLAN – Bluetooth – Wireless ATM: Working Group – Services – Reference Model – Functions – Radio Access Layer – Handover – Location Management – Addressing Mobile Quality of Service – Access Point Control Protocol.

MOBILE NETWORK LAYER **9 Hours**

Mobile IP: Goals – Assumptions and Requirement – Entities – IP Packet Delivery – Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – IPv6 – DHCP – Ad hoc Networks.

MOBILE TRANSPORT LAYER **9 Hours**

Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit/ Fast Recovery – Transmission/Timeout Freezing – Selective Retransmission – Transaction Oriented TCP.

WAP **9 Hours**

Architecture – Datagram Protocol – Transport Layer Security – Transaction Protocol – Session Protocol – Application Environment – Wireless Telephony Application.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. William C.Y.Lee, “Mobile Communication Design Fundamentals”, John Wiley, 1993.
2. William Stallings, “Wireless Communication and Networks”, Pearson Education, 2003.
3. Sandeep Singhal, “WAP–Wireless Application Protocol”, Pearson Education, 2003.

P15MA*T*E15 **NUMERICAL METHODS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Solve a set of algebraic equations representing steady state models.

CO 2: For the discrete data connected to each other or to use the concepts of operators, interpolation with equal and unequal intervals.

CO 3: Find the trend information from discrete data set through numerical differentiation and summary information through numerical integration.

CO 4: Predict the system dynamic behavior through solution of ODEs modeling the system.

Pre–requisite courses: Nil

SOLUTION OF EQUATIONS **9 Hours**

Solution of Nonlinear Equations: False Position Method – Fixed Point Iteration – Newton Raphson Method for a Single Equation. Solution of Linear System of Equations by Gaussian Elimination Method – Gauss Jordan Method – Iterative Methods: Gauss Jacobi and Gauss – Seidel Methods. Inverse of Matrix by Gauss – Jordan Method.

INTERPOLATION **9 Hours**

Forming the Difference Table, Operators, Relationship between the Operators – Newton'S Forward and Backward Difference Formulae – Central Difference Formula; Gauss Forward and Backward Formula; Equidistant Arguments with One or Two Missing Entries.

INTERPOLATION WITH UNEQUAL INTERVALS **9 Hours**

Divided Difference Table, Newton's Divided Difference Formula, Lagrange'S Formula – Inverse Interpolation.

NUMERICAL DIFFERENTIATION AND INTEGRATION **9 Hours**

Numerical Differentiation: Derivatives by using Newton'S Forward, Backward and Divided Differences. Numerical integration – Trapezoidal and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS **9 Hours**

Initial value problems – Single Step methods: Taylor's Series Method – Truncation Error – Euler and Improved Euler Methods – Fourth Order Runge – Kutta Method for Solving First and Second Order Equations – Multistep Method: Milne's Predictor – Corrector Method.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Steven C.Chapra & Raymond P. Canale, "Numerical Methods for Engineers with Programming and Software Applications", 6^{th} Edition, WCB/McGraw–Hill, 1998.
2. John H. Mathews & Kurtis D. Fink, "Numerical Methods using Matlab", 4^{th} Edition, Prentice Hall of India, 2004.

3. Gerald C. F. & Wheatley P.O, "Applied Numerical Analysis", 6th Edition, Pearson Education Asia, New Delhi, 2002.
4. Sastry S.S, "Introductory Methods of Numerical Analysis", 3rd Edition, Prentice – Hall of India Pvt Ltd, New Delhi, 2003.
5. Kandasamy P., Thilagavathy K. & Gunavathy K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2007.

P15CA*T*E41 **SOFT COMPUTING**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Become familiar with Neural Networks.

CO 2: Understand the need for genetic algorithm in the organization.

CO 3: Apply the fuzzy set theory for implementation.

Pre–requisite courses: Nil

INTRODUCTION **5 Hours**

Biological Basis for Neural Networks – Evolutionary Computation – Behavioral Motivations for Fuzzy Logic – Application Areas – Computational Intelligence Development.

NEURAL NETWORKS **10 Hours**

Neural Network Theory – Components and Terminology – Topologies – Learning – Recall – Taxonomy – Preprocessing and Post Processing – Implementation of Neural Network – Back Propagation – Learning Vector Quantizer – Radial Basis Function Networks – Kohonen Self Organizing Maps.

GENETIC ALGORITHM **6 Hours**

Evolutionary Computation Theory – Overview – Genetic Algorithm – Simple Example Problem – Programming – Strategies.

GENETIC PROGRAMMING **4 Hours**

Genetic Programming – Implementation of Genetic Algorithm and Particle Swarm Optimizer.

FUZZY SET THEORY **10 Hours**

Fuzzy System Theory – Fuzzy Sets and Fuzzy Logic – Approximate Reasoning – Issues – Fuzzy Systems Implementation.

COMPUTATIONAL INTELLIGENCE **10 Hours**

Computational Intelligence Theory – Definitions – Relationships among Components of Intelligent Systems Implementations – Metrics.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Russell C Eberhart & Yuhui Shi, "Computational Intelligence: Concepts to Implementations", AP Professional, 2009.
2. S.N.Sivanandam & S.N.Deepa, "Principles of Soft Computing", 1st Edition, Wiley India (P) Ltd, 2007.
3. Simon Haykin, "Neural Networks: A Comprehensive Foundation", 2nd Edition, Addison Wesley Longman, 2001.
4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Tata McGraw Hill.
5. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning",

Addison Wesley, N.Y.
6. S. Rajasekaran & G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.

P15CA*T*E42 PREDICTIVE ANALYTICS

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the principles of predictive analytics to pragmatic solutions.
CO 2: Apply predictive analytics for interpreting big data.
CO 3: Use predictive modelling in various applications.

Pre–requisite courses:

1. P15CA*T*E32 - Data Visualization

INTRODUCTION **7 Hours**

Overview of Predictive Analytics – Supervised and Unsupervised Learning – Parametric and Non–Parametric Models – Business Intelligence and Predictive Analytics – Statistics and Analytics – Predictive Analytics and Data Mining – Challenges in using Predictive Analytics.

DATA UNDERSTANDING **8 Hours**

Mean – Standard Deviation – Normal Distribution – Uniform Distribution – Applying Simple Statistics in Data Understanding – Skewness – Kurtosis – Rank – Ordered Statistics – Categorical Variable Assessment – Data Visualization in One Dimension – Histograms – Multiple Variable Summaries – Hidden Value in Variable Interaction – Combinatorial Explosion of Interactions – Correlation – Crosstabs – Scatterplots.

DATA PREPARATION **8 Hours**

Variable Cleaning – Incorrect Values – Consistency in Data Formats – Outliers – Missing Values – Feature Creation – Simple Variable Transformations – Fixing Skew – Binning Continuous Variables – Numeric Variable Scaling – Nominal and Ordinal Variable Transformations – Date and Time Variable Features – Zip Code Features – Multidimensional Features – Variable Selection Prior to Modelling – Sampling – Example.

PREDICTIVE MODELING **6 Hours**

Decision Trees – Reweighting Records: Priors and Misclassification Costs – Logistic Regression – Interpreting Logistic Regression Models – Neural Networks – Building Blocks – K–Nearest Neighbor – The K–NN Learning Algorithm – Distance Metrics.

ASSESSING PREDICTIVE MODELS **5 Hours**

Naive Bayes – Regression Models – Assessing Predictive Models: Batch Approach to Model Assessment – Percent Correct Classification – Rank – Ordered Approach to Model Assessment – Assessing Regression Models.

PREDICTIVE ANAYTICS **5 Hours**

Target Definitions – Linear and Logistic Regression – Decision Trees – Neural Networks – Support Vector Machines – Ensemble Methods – Multiclass Classification Techniques – Evaluating Predictive Models.

DESCRIPTIVE AND SOCIAL NETWORK ANALYTICS **6 Hours**

Descriptive Analytics: Association Rules – Sequence Rules – Segmentation – Social Network

Analytics: Definitions – Metrics – Learning – Relational Neighbor Classifier – Relational Logistic Regression – Collective Inferencing – Egonets – Biographs.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Dean Abbott, "Applied Predictive Analytics: Principles and Techniques for the Professional Data Analyst", John Wiley and Sons, 2014.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", John Wiley and Sons, 2014.
3. Eric Siegel, "Predictive analytics: The Power to predict who will Click, Buy, Lie, or Die", John Wiley and Sons, 2013.
4. Ron Klimberg & B.D. McCullough, "Fundamentals of Predictive Analytics with JMP", SAS Institute Inc, 2013.
5. James Wu & Stephen Coggeshall, "Foundations of Predictive Analytics", CRC Press, 2012.

P15CA*T*E43

STRATEGIC PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain knowledge and understanding of strategic planning and decision making with the day–to–day business.

CO 2: View the organization from the top and integrate everything within the organization.

CO 3: Assess the strategic management of projects within an organization to determine how it affects the organization's ability to grow in an ever–changing environment.

CO 4: Evaluate the potential strategic impact of a project.

Pre–requisite courses:

1. P15CA*T*401 - Software Project Management

INTRODUCTION **5 Hours**

Introduction – Strategic Project Management – Thinking Outside the Bar Chart – Tackling the Big Hairy Issues - Six Dangerous Planning Mistakes.

BUILDING STRONG PROJECT BACKBONES **5 Hours**

Concepts from the Cornfield – Making Strategy Simple – Test Strategic if–then IQ – Organizing Multiple Objectives into Tree.

THE LOGICAL FRAMEWORK **10 Hours**

The Best Solution Tool – System Thinking: Conceptual Foundation of the Logical Framework – Tackling the Four Critical Strategic Questions – Grab a Front Row Workshop Seat – Ingredients of The Grid.

ALIGNING PROJECTS WITH STRATEGIC INTENT **8 Hours**

Strategy in a Nutshell – Juggling Portfolios and Programs – Managing Multiple Bottom Lines – Quick and Clean Strategic Planning at any Level – Eight Logical Planning Steps.

PUTTING THE CONCEPTS INTO ACTION **8 Hours**

Managing the Strategic Action Cycle: Taking Cycle – Logical Approach – Types of Assessment: Project Monitoring – Project Status Review – Project Evaluation.

MANAGING THE PEOPLE DYNAMICS **9 Hours**

The Heart and Soul of the Projects – Engaging Key Stakeholders – Building Own Dream Team – Creating Shared Norms for High Performance – Techniques for Increasing Emotional Intelligence.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Terry Schmidt, "Strategic Project Management Made Simple: Practical Tools for Leaders and Teams", John Wiley & Sons Inc, 2009.
2. Azhar Kazmi, "Strategic Management and Business Policy", 3rd Edition, Tata McGraw

Hill, 2011.
3. Adriau Haberberg & Alison Rieple, “Strategic Management Theory & Application”, Oxford University Press, 2010.

P15CA*T*E44	PRINCIPLES OF MANAGEMENT AND ORGANIZATIONAL BEHAVIOR	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Identify the elements of effective management.

CO 2: Understand planning, organizing and control processes.

CO 3: Understand various theories related to the development of leadership skills, motivation techniques, team work and effective communication.

CO 4: Review and differentiate between individual and group behavior.

Pre–requisite courses: Nil

OVERVIEW OF MANAGEMENT THOUGHT **6 Hours**

Management – Definition – Importance – Functions – Skills Required for Managers – Roles and Functions of Managers – Science and Art of Management – Evolution of Classical, Behavioral and Contemporary Management Thoughts – Ethics and Social Responsibility of Managers.

PLANNING AND DECISION MAKING **8 Hours**

Essentials of Planning and Management by Objectives – Decision Making – Techniques for Planning and Decision Making.

ORGANISING **5 Hours**

Nature and Purpose of Organizing – Departmentation – Line and Staff Authority – Centralization Vs De–Centralization and Delegation of Authority.

STAFFING **4 Hours**

Overview of Staffing Function – Selection – Training – Placement – Performance Appraisal.

LEADING **4 Hours**

Manager Vs. Leader – Motivation – Theories and Techniques of Motivation – Leadership – Styles and Theories of Leadership.

CONTROLLING AND COMMUNICATION **6 Hours**

Communication – Process – Barriers – Improving Effectiveness in Communication – The System and Process of Controlling – Control Techniques and Information Technology.

DYNAMICS OF ORGANIZATION BEHAVIOUR **12 Hours**

Definition, Need and Importance of Organizational Behavior – Managing Individuals: Foundations of Individual Behavior – Attitudes and Job Satisfaction – Personality and Values – Learning – Work Stress – Managing Groups: Foundations of Group Behavior – Team Work – Conflict and Negotiation.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Harold Koontz & Heinz Weirich, "Essentials of Management – An International and Leadership Perspective", 9th Edition, Mc Graw Hill, 2012.

2. Andrew DuBrin, “Management Essentials”, 9th Edition, Cengage Learning, 2012.
3. Stephen P. Robbinsm, Timothy A. Judge & Neharika Vohra, “Organizational Behavior”, 14th Edition, Pearson Education, 2012.
4. K. Aswathappa & G. Sudarsana Reddy, “Management and Organizational Behavior”, Himalaya Publishing House, 2011.

P15CA*T*E45 **XML AND WEB SERVICES**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Gain more knowledge on XML and web services.

CO 2: Understand the need for web services in the organization.

CO 3: Apply the SOAP protocol in the real time environment.

Pre–requisite courses: Nil

INTRODUCTION **9 Hours**

Role of XML – XML and the Web – XML Language Basics – Simple Object Access Protocol (SOAP) – Web Services – Revolutions of XML – Service Oriented Architecture (SOA).

XML TECHNOLOGY **9 Hours**

XML Technology: XML – Name Spaces – Structuring with Schemas and DTD – Presentation Techniques – Transformation – XML Infrastructure.

SOAP **9 Hours**

Overview of SOAP – HTTP – XML – RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns and Faults – SOAP with Attachments.

WEB SERVICES **9 Hours**

Overview – Architecture – Key Technologies – UDDI – WSDL – ebXML (Electronic Business XML) – SOAP and Web Services in E–Com – Overview of .NET and J2EE.

XML SECURITY **5 Hours**

Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Digital Signature.

XKMS (XML Key Management Service) **4 Hours**

Structure – Guidelines for Signing XML Documents – XML in Practice.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Ramesh Nagappan, Robert Skoczylas & Rima Patel Sriganesh, "Developing Java Web Services", Wiley Publishing Inc., 2004.
2. Sandeep Chatterjeen & James Webber, "Developing Enterprise Web Services", Pearson Education, 2004.
3. Charles F.Goldfarb & Paul Prescod, "The XML Hand Book", 3rd Edition, Pearson Education, 2001.
4. Ed Tittel, "XML for Dummies", Wiley Publishing, 2002.
5. Frank. P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.

P15CA*T*E46 **MACHINE LEARNING**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the set of well known supervised and unsupervised algorithms.

CO 2: Design and implement various machine learning algorithms in real world applications.

CO 3: Solve problems on machine learning.

Pre–requisite courses:

1. P15CA*T*301 - Data warehousing and Data Mining

INTRODUCTION **4 Hours**

Machine Learning – Examples of Machine Learning: Learning Associations – Classification – Regression – Unsupervised Learning – Reinforcement Learning.

SUPERVISED LEARNING **6 Hours**

Learning a Class from Examples – Vapnik – Chervonenkis (VC) Dimension – Probably Approximately Correct (PAC) Learning – Noise – Learning Multiple Classes – Model Selection and Generalization.

MULTIVARIATE METHODS **6 Hours**

Multivariate Data – Parameter Estimation – Estimation of Missing Values – Multivariate Normal Distribution – Multivariate Classification – Tuning Complexity – Discrete Features – Multivariate Regression.

DIMENSIONALITY REDUCTION **6 Hours**

Introduction – Subset Selection – Principal Component Analysis – Factor Analysis – Multidimensional Scaling – Linear Discriminant Analysis – Isomap – Locally Linear Embedding.

CLUSTERING **6 Hours**

Mixture Densities – K–Means Clustering – Expectation – Maximization Algorithm – Mixtures of Latent Variable Models – Supervised Learning after Clustering – Hierarchical Clustering – Choosing the Number of Clusters.

LINEAR DISCRIMINATION **4 Hours**

Generalizing the Linear Model – Geometry of the Linear Discriminant – Pairwise Separation – Parametric Discrimination Revisited – Gradient Descent – Logistic Discrimination – Discrimination by Regression.

MULTILAYER PERCEPTRONS (MLP) **8 Hours**

Introduction – The Perceptron – Training a Perceptron – Learning Boolean Functions – Multilayer Perceptrons – MLP as a Universal Approximator – Back Propagation Algorithm – Training Procedures – Tuning the Network Size – Bayesian View of Learning – Dimensionality Reduction – Learning time.

BAYESIAN ESTIMATION **5 Hours**

Estimating the Parameter of a Distribution – Bayesian Estimation of the Parameters of a Function – Gaussian Processes.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Ethem Alpaydin, “Introduction to Machine Learning”, Prentice Hall of India, 2009.
2. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2010.
3. Tom M.Mitchell , “Machine Learning”, McGraw Hill Education Edition, 2013.
4. Kevin P.Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012.
5. Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.

P15CA*T*E47 TCP/IP PROTOCOL SUITE

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the implementation of various standards in the network protocols.
CO 2: Interact with the network utilities.
CO 3: Know the design aspects involved in the protocols of the TCP/IP protocol suite.
CO 4: Design, implement, configure and manage a computer network.

Pre–requisite courses:

1. P13CA*T*202 - Computer Networks

INTRODUCTION 10 Hours

Standards – Internet – OSI Model – TCP/IP Protocol suite – Addressing – Wired Local Area Networks – Wireless Local Area Networks – Connecting Devices.

INTERNET PROTOCOL 10 Hours

IP addressing – Introduction – Classful Addressing – Classless Addressing – Special Address – NAT IP Packets – Delivery – Forwarding – Structure of Router – IPv4 Introduction – Datagram – Fragmentation – Checksum – IP Package – Address Resolution Protocol (ARP) – Internet Control Message Protocol (ICMP) – Internet Protocol Version 6 (IPV6) Addressing – IPV6 Protocol.

TRANSPORT PROTOCOL 8 Hours

User Datagram Protocol (UDP) – UDP Applications – UDP Package – UDP Design – Transmission Control Protocol (TCP) Services – TCP Features – Segment – Connection – State Transition Diagram – Windows in TCP – Flow Control – Error Control – Congestion Control.

APPLICATION LAYER AND CLIENT SERVER MODEL 8 Hours

Client Server Paradigm – Dynamic Host Configuration Protocol(DHCP) – DHCP Operation – DHCP Configuration – Domain Name System (DNS) – Name Space – DNS in the Internet – Resolution – DNS Message – Types of Records – TELNET.

APPLICATION PROTOCOLS 8 Hours

File Transfer Protocol (FTP) – Connections – Communication – World Wide Web and Hypertext Transfer Protocol (HTTP) – Electronic Mail – Simple Network Management Protocol (SNMP) – Management Components – Structure Management Information (SMI) – Management Information Base (MIB).

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4th Edition, Tata McGraw Hill, 2010.
2. Douglas E. Comer & David L. Stevens, "Internetworking with TCP/IP –Volume I, II and III", 5th Edition, Prentice–Hall of India Pvt. Ltd., 2005.

P15CA*T*E48 **SOFTWARE RELIABILITY AND METRICS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Acquire knowledge to evaluate software artifacts with a rigorous and modern approach.
CO 2: Learn how to manage software development projects to produce high quality software.
CO 3: Understand how, where and when improving real software products and processes with the application of basic mathematical concepts.

Pre–requisite courses:

1. P15CA*T*203 - Software Engineering

INTRODUCTION TO SOFTWARE RELIABILITY **7 Hours**

Basic Concepts – Failure and Faults – Environment – Availability – Modeling – Uses.

SOFTWARE RELIABILITY MODELING **12 Hours**

Concepts – General Model Characteristic – Historical Development of Models – Model Classification Scheme – Markovian Models – General Concepts – General Poisson Type Models – Binomial Type Models – Poisson Type Models – Fault Reduction Factor for Poisson Type Models.

COMPARISON OF SOFTWARE RELIABILITY MODELS **10 Hours**

Comparison Criteria – Failure Data – Comparison of Predictive Validity of Model Groups – Recommended Models Comparison of Time Domains – Calendar Time Modeling – Resource Concept – Resource Usage model – Resource Utilization – Calendar Time Estimation and Confidence Intervals.

FUNDAMENTALS OF MEASUREMENT **8 Hours**

Measurements in Software Engineering – Scope of Software Metrics – Measurements Theory – Goal based Framework – Software Measurement Validation.

PRODUCT METRICS **8 Hours**

Measurement of Internet Product Attributes – Size and Structure – External Product Attributes – Measurement of Quality – Reliability Growth Model – Model Evaluation.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. John D. Musa., Anthony Iannino & Kazuhira Okumoto, “Software Reliability – Measurement, Prediction, Application, Series in Software Engineering and Technology”, Tata McGraw Hill, 1990.
2. John D. Musa, “Software Reliability Engineering”, Tata McGraw Hill, 2005.
3. Norman E. Fenton & Shari Lawrence Pfleeger, "Software Metrics", 2nd Edition, International Student Edition, 2003.

P15CA*T*E49 **SOFTWARE AGENTS**

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Describe how agents are used to enhance learning and provide intelligent assistance to users.

CO 2: Discuss about agent–to–agent communication and the use of agents to provide intelligent interoperability in distributed systems and the Internet.

CO 3: Understand the mobile agent concepts.

Pre–requisite courses:

1. P15CA*T*E14 - Agent based intelligent systems

AGENT AND USER EXPERIENCE **9 Hours**

Interacting with Agents – Agent from Direct Manipulation to Delegation – Interface Agent Metaphor with Character – Designing Agents – Direct Manipulation Vs Agent Path to Predictable.

AGENTS FOR LEARNING IN INTELLIGENT ASSISTANCE **9 Hours**

Agents for Information Sharing and Coordination – Agents that Reduce Work Information Overhead – Agents without Programming Language – Life like Computer Character – Software Agents for Cooperative Learning – Architecture of Intelligent Agents.

AGENT COMMUNICATION AND COLLABORATION **9 Hours**

Overview of Agent Oriented Programming – Agent Communication Language – Agent Based Framework of Interoperability.

AGENT ARCHITECTURE **9 Hours**

Agents for Information Gathering – Open Agent Architecture – Communicative Action for Artificial Agent.

MOBILE AGENTS **4 Hours**

Mobile Agent Paradigm – Mobile Agent Concepts.

MOBILE AGENT TECHNOLOGY **5 Hours**

Mobile Agent Technology – Case Study: Tele Script, Agent Tel.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Jeffrey M.Bradshaw, "Software Agents", MIT Press, 2000.
2. William R. Cockayne & Michael Zyda, “Mobile Agents”, Prentice Hall, 1998.
3. Stuart Jonathan Russel & Peter Norvig, “Artificial Intelligence: A Modern Approach”, 2nd Edition, Prentice Hall, 2002.
4. Joseph P.Bigus & Jennifer Bigus, “Constructing Intelligent agents with Java: A Programmer's Guide to Smarter Applications”, Wiley, 1997.

P15MA*T*E16

RESOURCE MANAGEMENT TECHNIQUES

L	T	P	C
3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Construct the mathematical models by means of Linear Programming, Assignment and Transportation models to get optimum solution.

CO 2: Construct the network and analyze the same to get optimum solution.

CO 3: Analyze the concepts of time series and methods to find the variations.

CO 4: Gain knowledge in the construction of index numbers.

Pre–requisite courses: Nil

LINEAR PROGRAMMING MODELS 9 Hours

Mathematical Formulation – Graphical Solution of Linear Programming Models – Simplex Method – Artificial Variable Techniques – Variants of Simplex Method.

TRANSPORTATION AND ASSIGNMENT MODELS 9 Hours

Transportation Problem – Methods for Finding Initial Basic Feasible Solution – Optimum Solution – Degeneracy – Assignment Models – Hungarian Algorithm – Variants of the Assignment Problem.

SCHEDULING BY PERT AND CPM 9 Hours

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.

TIME SERIES 9 Hours

Components of Time Series – Trend – Determination of Trend by Moving Averages, Least Square Methods, Seasonal Variations – Ratio to Moving Average Method, Link Relative Method.

INDEX NUMBERS 9 Hours

Construction of Index Numbers: Un–Weighted, Weighted Index Numbers, Averages of Price Relatives – Criteria of a Good Index Number: Time Reversal Test, Factor Reversal Test – Cost of Living Index.

Theory: 45 Hours **Tutorial: -** **Total: 45 Hours**

REFERENCES

1. Hamdy A.Taha, "Operation Research: An Introduction", 4th Edition, Mc Millan Co., 2003.
2. Don T.Phillips, A.Ravindran & James Solberg, "Operations Research: Principles and Practice", 2nd Edition, John Wiley & Sons, 1992.
3. Schaum's, "Operations Research", 2nd Edition, Richard Bronson, Govindasami Naadimuthu, Tata Mcgraw – Hill Publishing Co. Ltd. 2000.
4. Hillier & Lieberman, "Introduction to Operations Research", 7th Edition, McGraw Hill International Edition, 2001.
5. R.S.N Pillai & V.Bagavathi, "Statistics", S.Chand and Company Ltd., 2010.

ONE CREDIT COURSES

P15CAIN01 AGILE METHODOLOGY

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand and apply agile principles while developing software.
CO 2: Establish a healthy collaboration between development teams.

Pre–requisite courses:

1. P15CA*T*203 - Software Engineering

Beginning Agility – Agile Manifesto and Principles – Agile Success Factors– Delivering what users want – Agile Planning – Caring about Quality – Collaboration – Listening to Feedback – Combining Scrum with XP – Case Studies.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Venkat Subramaniam & Andy Hunt, "Practices of an Agile Developer", The Pragmatic Bookshelf, 2006.
2. Rachel Davies & Liz Sedley, "Agile Coaching", The Pragmatic Bookshelf, 2012.
3. Henrik Kniberg, "Scrum and XP from the Trenches–How we do Scrum", InfoQ Enterprise Software Development Series, 2007.

P15CAIN02 ANDROID TECHNOLOGIES

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the basic concepts of an android application.

CO 2: Develop an android application and deploy the same.

Pre–requisite courses:

1. P15CA*T*103 - Operating Systems

Android – Android Versions – Features of Android – Architecture of Android – Obtaining the Required Tools – Android SDK – Installing the Android SDK Tools – Configuring the Android SDK Manager – Eclipse – Android Development Tools (ADT) – Creating Android Virtual Devices (AVD) – Creating a first Android Application – Types of Android Application – Anatomy of an Android Application.

Android – Android Versions – Features of Android – Architecture of Android – Obtaining the Required Tools – Android SDK – Installing the Android SDK Tools – Configuring the Android SDK Manager – Eclipse – Android Development Tools (ADT) – Creating Android Virtual Devices (AVD) – Creating a first Android Application – Types of Android Application – Anatomy of an Android Application.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Wei – Meng Le, “Beginning Android 4 Application Development”, John Wiley & Sons, Inc, 2012.
2. Reto Meier, “Professional Android 4 Application Development”, John Wiley & Sons, Inc, 2012.
3. Zigurd Mednieks, Laird Dornin, Blake Meike G & Masumi Nakamura, “Programming Android”, O’Reily Books, 2011.

P15CAIN03 ETHICAL HACKING

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Defend a computer and network against a variety of security attacks using a number of hands–on techniques.

CO 2: Practice and use safe techniques on the World Wide Web and develop security policies.

Pre–requisite courses:

1. P15CA*T*204 - Ethics in Computing

Introduction to Ethical Hacking – Hacking Operating System – Hacking Network – Website Hacking – Foot Printing – Checking the Status of Ports.

Phishing – Password – Privacy – Denial of Service Attacks – Microsoft Operating System Vulnerabilities – Linux Operating System Vulnerabilities – Viruses and Worms – Network Security Devices.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Michael T. Simpson, "Ethical Hacking and Network Defense", Cengage Learning India Private Limited, New Delhi, 2010.
2. Ankit Fadia, "An Unofficial Guide to Ethical Hacking", Macmillan India Ltd., New Delhi, 2010.

P15CAIN04 INTERNET OF THINGS

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the design of IOT.

CO 2: Identify and design the new models for market strategic interaction.

Pre–requisite courses: Nil

Definitions and Functional Requirements – Architecture – Web 3.0 View of IoT – Ubiquitous IoT Applications – Four Pillars of IoT – DNA (Devices, Networks and Applications) of IoT – The Toolkit Approach for end–user Participation in the Internet of Things.

The Role of the IOT for Increased Autonomy and Agility in Collaborative Production Environments – Resource Management in the IOT: Clustering, Synchronization and Software Agents.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
2. Dieter Uckelmann, Mark Harrison & Florian Michahelles, "Architecting the Internet of Things", Springer, 2011.

P15CAIN05 MULTIMEDIA SYSTEMS

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Understand the basic concepts of multimedia.

CO 2: Construct multimedia applications for various domains.

Pre–requisite courses: Nil

Multimedia Hardware and Software – Components of Multimedia – Text – Audio – Images and Graphics – Video and Animation.

Multimedia Data Base Systems – Synchronization Issues – Presentation Requirements – Applications – Video Conferencing – Virtual Reality – Interactive Video – Video on Demands.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Ashok Banerji & Ananda Mohan Ghosh, "Multimedia Technologies", Tata McGraw Hill, 2010.
2. Judith Jeffcoate, "Multimedia in Practice: Technology and Applications", Pearson Education, 2011.
3. Tay Vaughan, "Multimedia: Making it Work", 7th Edition, Tata McGraw Hill, 2008.

P15CAIN06 SOFT SKILLS

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Perform well in a team and positively resolve conflict in timely manner.

CO 2: Set realistic goals and manage stress well.

Pre–requisite courses: Nil

Self Analysis: SWOT Analysis – Who Am I – Attributes – Importance of Self Confidence– Self Esteem. **Attitude:** Factors Influencing Attitude – Challenges – Lessons from Attitude – **Motivation:** Factors of Motivation – Self Talk – Intrinsic and Extrinsic Motivators. **Goal Setting:** Wish List – Smart Goals – Blue Print for Success – Short Term – Long Term – Life Time Goals.

Interpersonal Skills: Understanding the Relationship between Leadership Networking and Team Work – Necessity of Team Work – **Stress Management:** Causes of Stress and its Impact – How to Manage Distress – Understanding the Circle of Control – Stress Busters. **Decision Making**: Importance and Necessity of Decision Making – Process of Decision Making – Practical Way of Decision Making – Weighing Positives and Negatives.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Barun K. Mitra, "Personality Development and Soft Skills", Oxford Publisher, 2011.
2. Nitin Bhatnagar, "Effective Communication and Soft Skills", Pearson Education India 2012.

P15CAIN07 TECHNICAL WRITING

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Express themselves in different kind of writing from creative to critical and factual writing.
CO 2: Identify and critique effective technical writing techniques and practices.

Pre–requisite courses: Nil

Techniques of Writing – Emails – Minutes – Reports of different Kinds – Annual Report – Status Report – Survey Report – Proposals – Memorandums – Presentations – Interviews – Profile of Institutions – Speeches – Responding to Enquiries – Complaints – Resumes – Applications – Summarizing – Strategies for Writing.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Sharan J Gerson & Steven M Gerson, "Technical Writing: Process and Product", 8th Edition, Pearson Education, New Delhi, 2013.

P15CAIN08 HUMAN EXCELLENCE – PROFESSIONAL VALUES

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Acquire knowledge through personality development.

CO 2: Demonstrate skills of self–control.

Pre–requisite courses: Nil

Human Excellence: Introduction – Objective – Personal Values – Importance – **Life:** Self – Society – Nature – Yoga – Purpose and Philosophy of Life – **Personality Concepts**: Introspection – Six Temperaments and their Maneuvering – Analysis of Thought – Moralizing of Desire – Neutralization of Anger – Eradication of Worries – Training: Stress Management – Time Management.

Leadership Traits: Carrying Oneself – Factors of Leadership – Principles of Leadership – **Self Control**: Importance – Techniques to Development Oneself – Ten Commandments of Self–Development – Self–Control Technique for Teenagers – Training: Method of Self Control – **Empowerment of Mind**: Body, Soul and Mind – Bio Magnetism – Genetic Centre – Mind: Origin and its Ten Stages – Simplified Physical Exercises – **KayaKalpa Yoga**: Aim – Kayakalpa Philosophy – Importance of Kayakalpa Training – Training: Kaya Kalpa Yoga – **Meditation**: Introduction of Meditation – Benefits of Meditation – Training: Agna Meditation – Santhi Meditation.

Theory: 15 Hours **Tutorial: -** **Total: 15 Hours**

REFERENCES

1. Vethathiri's Maharishi's, "Yoga for Modern Age", The World Community Service Centre, Vethathiri Publications, 2009.
2. Vethathiri's Maharishi's, "Genetic Centre", The World Community Service Centre, Vethathiri Publications, 2003.
3. Vethathiri Maharishi's, "Rejuvenating Life Force and Mind" – paper–III for M.A. Yoga for Human Excellence", 3rd edition, The World Community Service Centre, Vethathiri Publications, 2010.
4. Swami Vivekananda, "Selections from the Complete Works", 23rd Edition, The Ramakrishna Mission Institute of Culture, 2007
5. Vethathiri's Maharishi's, "Mind", The World Community Service Centre, Vethathiri Publications, 1999.
6. Russell Kelfer, "Self Control", Tyndale House Publishers, 1985.
7. Dr. A. Chandra Mohan, "Leadership and Management", Himalaya Publication House.
8. Robert W. Bly, "Make Every Second Count", Career Press, Incorporated, 2010.
9. Vethathiri's Maharishi's, "Manavalakalai Part 1, 2 and 3", 11th Edition, The World Community Service Centre, Vethathiri Publications, 1994.
10. Swami Vivekananda, "Karma Yoga", 39th Edition, The Ramakrishna Mission Institute of Culture, 2008.