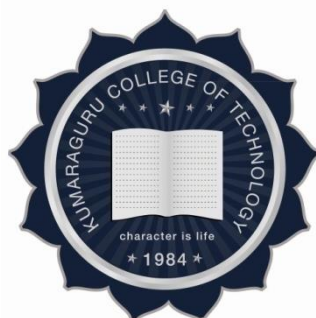# KUMARAGURUCOLLEGE OF TECHNOLOGY, COIMBATORE – 641 049

REGULATIONS 2018

CURRICULUM & SYLLABUS

MCA

I - VI Semesters

Department of Computer Applications

KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE – 641 049
REGULATIONS 2018

MCA
CURRICULUM

Course Code	Course Title	Course Mode	L	T	P	J	C
Semester I							
P18CAT1001	Problem Solving and Programming	Theory	3	0	0	0	3
P18CAT1102	Computer Organization	Theory	3	1	0	0	4
P18CAT1103	Operating Systems	Theory	3	1	0	0	4
P18MAT1101	Mathematics for Computer Applications	Theory	3	1	0	0	4
P18ENI1601	English for Pragmatic Usage	Embedded Lab& Project	0	0	2	2	2
P18CAP1501	C Programming Lab	Lab	0	0	4	0	2
P18CAP1502	Multimedia Lab	Lab	0	0	4	0	2
					Total Credits		21
					Total Hours per week		27
SEMESTER-II							
Course Code	Course Title	Course Mode	L	T	P	J	C
P18CAT2101	Data Structures	Theory	3	1	0	0	4
P18CAI2202	Database Management System	Embedded – Theory &Lab	3	0	2	0	4
P18CAT2103	Computer Networks	Theory	3	1	0	0	4
P18CAI2304	Software Engineering	Embedded - Theory & Project	3	0	0	2	4
P18CAP2501	Data Structures Lab Using C	Lab	0	0	4	0	2
P18CAP2502	Python Programming Lab	Lab	0	0	4	0	2
P18ENP2501	Professional Skills I	Lab	0	0	2	0	1
					Total Credits		21
					Total Hours per week		28
SEMESTER-III							
Course Code	Course Title	Course Mode	L	T	P	J	C
P18CAI3201	User Interface Design and Development	Embedded – Theory &Lab	3	0	2	0	4
P18CAT3102	Analysis of Algorithms	Theory	3	1	0	0	4
P18CAT3003	Data Mining and Visualization	Theory	3	0	0	0	3
P18MAI3201	Probability and Statistics for Data Analysis	Embedded – Theory &Lab	3	0	2	0	4
P18CAI3204	Programming with JAVA	Embedded – Theory &Lab	3	0	2	0	4
P18ENP3501	Professional Skills II	Lab	0	0	2	0	1
P18INI3600	Engineering Clinic –I	Embedded Lab& Project	0	0	4	2	3
					Total Credits		23
					Total Hours per week		30

SEMESTER-IV

Course Code	Course Title	Course Mode	L	T	P	J	C
P18CAI4201	Software Testing	Embedded - Theory &Lab	3	0	2	0	4
P18CAT4102	Big Data Analytics	Theory	3	1	0	0	4
P18CAI4203	Web Development	Embedded – Theory & Lab	3	0	2	0	4
P18CAE _ _ _ _	Programme Elective I	Theory	3	0	0	0	3
P18CAP4501	Mobile Application Development Lab	Lab	0	0	4	0	2
P18ENP4501	Professional Skills III	Lab	0	0	2	0	1
P18INI4600	Engineering Clinic –II	Embedded Lab& Project	0	0	4	2	3
						Total Credits	**21**
						Total Hours per week	**29**

SEMESTER-V							
Course Code	**Course Title**	**Course Mode**	**L**	**T**	**P**	**J**	**C**
P18CAI5301	Cloud Application Development	Embedded - Theory & Project	3	0	0	2	4
P18CAE _ _ _ _	Programme Elective II	Theory	3	0	0	0	3
P18CAE _ _ _ _	Programme Elective III	Theory	3	0	0	0	3
P18CAP5701	Mini Project / Industry	Project	0	0	0	12	6
						Total Credits	**16**
						Total Hours per week	**23**

SEMESTER-VI							
Course Code	**Course Title**	**Course Mode**	**L**	**T**	**P**	**J**	**C**
P18CAP6701	Project Work / Industry	Project	0	0	0	24	12
						Total Credits	**12**
						Total Hours per week	**24**

Grand Total Credits: 114

List of Program Electives

Code No.	Course Title	Course Type	L	T	P	J	C
P18CAE0001	Service Oriented Architecture	PE	3	0	0	0	3
P18CAE0002	Information Security	PE	3	0	0	0	3
P18CAE0003	Object Oriented Analysis and Design	PE	3	0	0	0	3
P18CAE0004	Game Development	PE	3	0	0	0	3
P18CAE0005	Software Project Management	PE	3	0	0	0	3
P18CAE0006	E- Commerce	PE	3	0	0	0	3
P18CAE0007	TCP/IPV6 Protocol Suite	PE	3	0	0	0	3
P18CAE0008	Wireless Networks	PE	3	0	0	0	3
P18CAE0009	Ethics in Computing	PE	3	0	0	0	3
P18CAE0010	Domain Analytics	PE	3	0	0	0	3
P18CAE0011	Artificial Intelligence	PE	3	0	0	0	3
P18CAE0012	Accounting and Financial Management	PE	3	0	0	0	3
P18CAE0013	Enterprise Resource Planning	PE	3	0	0	0	3
P18CAE0014	Managing Technical People	PE	3	0	0	0	3

List of One Credit Courses

Code No.	Course Title
P18CAC0201	Agile Methodology
P18CAC0202	Android Technologies
P18CAC0203	Ethical Hacking
P18CAC0204	Internet of Things
P18CAC0205	Multimedia Systems
P18CAC0206	Soft Skills
P18CAC0207	Technical Writing
P18CAC0208	Human Excellence – Professional Values
P18CAC0209	Data Analytics
P18CAC0210	PHP with Laravel Framework

I SEMESTER

P18CAT1001	PROBLEM SOLVING AND PROGRAMMING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1: Explain the basics of problem solving techniques
CO2: Select appropriate data types and control structures for solving a given problem
CO3: Illustrate the representation of arrays, strings and usage of string operations
CO4: Illustrate the importance of pointers and functions
CO5: Explain the fundamentals of structures and unions
CO6: Explain the fundamentals of file handling

Pre–requisite : Nil

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

INTRODUCTION TO COMPUTER PROBLEM SOLVING	9 Hours

Introduction – The Problem Solving Aspect – Top Down Design – Implementation of Algorithm – Program Verification – The Efficiency of Algorithms – The analysis of Algorithms – Fundamental Algorithms.

PROGRAMMING ANDALGORITHMS	9 Hours

Programs and Programming – Building Blocks for Simple Programs -Pseudo Code Representation – Flow Charts - Programming Languages - Compiler –Interpreter, Loader and Linker - Program Execution – Classification of Programming Language - Structured Programming Concept.

BASICS OF 'C', INPUT / OUTPUT & CONTROL STATEMENTS	9 Hours

Introduction- Identifier – Keywords - Variables – Constants – I/O Statements - Operators - Initialization – Expressions – Expression Evaluation – Lvalues and Rvalues – Type Conversion in C –Formatted Input and Output Functions - Specifying Test Condition for Selection and Iteration- Conditional Execution - and Selection – Iteration And Repetitive Execution- Go To Statement – Nested Loops- Continue and Break Statements

ARRAYS, STRINGS, FUNCTIONS AND POINTERS	9 Hours

Array – One Dimensional Character Arrays- Multidimensional Arrays- Arrays of Strings – Two Dimensional Character Array – Functions - Parameter Passing Mechanism Scope – Storage Classes – Recursion - Comparing Iteration and Recursion- Pointers – Pointer Operators - Uses of Pointers- Arrays and Pointers – Pointers and Strings - Pointer Indirection- Pointers to Functions - Dynamic Memory allocation.

USER-DEFINED DATATYPES AND FILES	9 Hours

Structures – Initialization - Nested Structures – Structures and Arrays – Structures and Pointers - Union– Type def and Enumeration Types - Bit Fields - File Management in C – Files and Streams – File Handling Functions – Sequential Access File- Random Access File – Command Line Arguments.

Theory: 45 Hrs	Tutorial: -	Total Hours: 45 Hrs

REFERENCES

1. Byron S Gottfried, —"Programming with C", Schaums Outlines, 2 nd, Tata McGraw-Hill, 2006.

2. BrianW. Kernighan and Dennis M. Ritchie, "The C programming Language",2006, Prentice-Hall.

3. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms", McGraw Hill, Publishers, 2002.

4. Deitel and Deitel, "C How to Program", Pearson Education. 2013,7th Edition.

5. "Mastering C" by K R Venugopal, Sudeep R Prasad McGraw Hill Education (India) Private Limited; 2 ndEdition,2015.

6. PradipDey, Manas Ghosh, —"Computer Fundamentals and Programming in C", 2 nd Edition, Oxford University Press, 2013.

P18CAT1102	COMPUTER ORGANIZATION	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO 1: Possess basic knowledge for the design of digital logic circuits and apply to computer organization.

CO 2: Understand the functional units of the processor.

CO 3: Familiarize with the representation of data, addressing modes and instruction sets.

CO 4: Understand the major components of a computer including CPU and Input/output organization.

CO 5: Know about the memory hierarchy and its impact of computer performance

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
  1. Continuous Assessment Test I, II
  2. Assignment; Group Presentation
  3. End Semester Examination

INDIRECT
  1. Course-end survey

DIGITAL LOGIC CIRCUITS	**9 Hours**

Digital computers – Logic gates – Boolean Algebra – Map Simplification – Combinational Circuits – Flip-Flops: SR Flip-Flops, D Flip-Flops, JK Flip-Flops, T Flip-Flops, Excitation Tables.

DIGITAL COMPONENTS	**8 Hours**

Integrated Circuits – Decoders – Encoders – Multiplexers – Registers – Register with Parallel Load – Shift Registers – Bidirectional Shift Register with Parallel Load – Binary Counters – Binary Counter with Parallel Load.

DATA REPRESENTATION	**4 Hours**

Data Types – Complements – Fixed-Point Representation – Integer Representation – Arithmetic Addition – Arithmetic Subtraction – Overflow – Floating-Point Representation.

REGISTER TRANSFER AND MICROOPERATIONS	**4 Hours**

Register Transfer – Bus and Memory Transfer – Arithmetic Micro Operations – Binary Adder – Binary Adder –Subtractor – Logic Micro Operations.

BASIC COMPUTER ORGANIZATION	**6 Hours**

Instruction Codes – Timing and Control – Instruction Cycle – Fetch and Decode – Type of Instruction – Register Reference Instructions –Memory Reference Instructions – Input – Output and Interrupt.

CPU ORGANIZATION	**6 Hours**

General Register Organization – Control Word – Instruction formats – Three Address Instructions – Two Address Instructions – One Address Instructions – Zero Address Instructions – RISC Instructions – Addressing Modes.

I/O AND MEMORY ORGANIZATION	**8 Hours**

Input and Output interface – Asynchronous Data transfer – Modes of Transfer – DMA – DMA Controller – DMA Transfer – Input/Output Processor – CPU – IOP Communication – Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Virtual Memory.

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

REFERENCES

1. Morris Mano M, "Computer System Architecture", Prentice Hall, 2013.
2. V.C. Hamacher, Z.G. Vranesic&S.G.Zaky, "Computer Organization", Tata McGraw Hill, 2011.
3. John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 2012.
4. William Stallings, "Computer Organization and Architecture: Designing for Performance", Prentice Hall, 2012.

P18CAT1103	OPERATING SYSTEMS	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO1	Know the basics of operating systems.	
CO2	Understand process synchronization and deadlock concepts	
CO3	Analyze various memory management techniques.	
CO4	Use disk management and disk scheduling algorithms for better utilization of external memory	
CO5	Recognize file system interface, protection and security mechanisms.	

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
   1.Continuous Assessment Test I, II
   2.Assignment; Group Presentation
   3.End Semester Examination

INDIRECT
   1.Course-end survey

INTRODUCTION	7Hours

Operating System – Computer System Organization – Computer System Architecture – Operating System Structure – Operations – Process Management – Memory Management-Secondary Storage Management – Protection and Security – Open Source Operating System – Operating System Services – User Interface – System Calls – System Programs – Design and Implementation – Debugging.

PROCESS MANAGEMENT	6 Hours

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

PROCESS SYNCHRONIZATION	5Hours

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

CPU SCHEDULING	5Hours

Basic Concepts – Scheduling Criteria – Scheduling Algorithms.

DEADLOCK	4Hours

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

MEMORY MANAGEMENT	4Hours

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

VIRTUAL MEMORY MANAGEMENT	3Hours
Background – Demand Paging – Copy on Write – Page Replacement – Thrashing – Working Set.	

I/O MANAGEMENT AND DISK SCHEDULING	4Hours
Organization ofI/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	4Hours
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	3 Hours
Mobile OS – Solaris – Windows –UNIX (Linux) OS – Using System Editor – Basic UNIX (Linux) Commands.	

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

REFERENCES

1. Abraham Silberschatz& Peter B. Galvin, "OperatingSystem Concepts", 9th Edition, John Wiley&Sons,Inc.,2013.
2. P.C.Bhatt, "AnIntroductionto OperatingSystems–Concepts andPractice",4th Edition, Prentice Hall of India., 2013.
3. WilliamStallings,"OperatingSystems:Internalsand Design Principles",7th Edition, Prentice Hall of India.,2012.
4. D.M.Dhamdhere,"OperatingSystems:AConceptbasedApproach", 3rdEdition, Tata McGraw Hill, 2012.

P18MAT1101	MATHEMATICS FOR COMPUTER APPLICATIONS	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO1: Analyze the given propositions and finding results using mathematical logic operators.
CO2: Identify the different types of grammars and able to generate various languages.
CO3: Findeigen values and eigen vectors of real symmetric and non symmetric matrices.
CO4 : Solve the system of linear homogeneous as well as non homogeneous equations and analyze the consistency of the system of linear equations.
CO5 : Find the solution of non linear algebraic and transcendental equations by numerical methods.
CO6: Predict the interpolated values using difference formulae.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1.Continuous Assessment Test I, II
2.Assignment; Group Presentation
3.End Semester Examination
INDIRECT
1. Course-end survey

MATHEMATICAL LOGIC	10 Hours
Propositions and Logical Operators – Truth Table – Equivalence and Implication – Basic Laws – Normal Forms – Principal Conjunctive and Disjunctive Normal Forms – Rules of Inference – Arguments – Validity of Arguments – Proofs in Propositional Calculus – Predicate Calculus – Validity of Arguments.	

FORMAL LANGUAGES	9 Hours
Languages and Grammars – Phrase Structure Grammar – Classification of Grammars – Languages Generated by Grammars – Pumping Lemma for Regular Languages.	

MATRICES	9 Hours
Characteristic Equation – Eigen Values and Eigenvectors of a Real Matrix – Properties of Eigen Values and Eigenvectors (Without Proof) – Eigen Values of a Matrix by Power Method – Cayley Hamilton Theorem.	

SOLUTION OF A SYSTEM OF LINEAR EQUATIONS	8 Hours
Rank of a Matrix – Consistency of a System of Linear Equations – Rouche's Theorem – Solution of Linear System of Equations by Gauss Elimination Method and Gauss Jordan Method – Gauss Seidel Method – Matrix Inversion by Gauss Jordan Method.	

NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS	5 Hours
Solution of Nonlinear Equations – Method of False Position – Fixed Point Iteration Method – Newton Raphson Method for a Single Equation.	

INTERPOLATION	4 Hours
Interpolation: Newton's Forward and Backward Difference Formulas – Lagrange's Interpolation – Inverse Interpolation.	

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

REFERENCES

1. McGraw Kenneth.Rosen H., "Discrete Mathematics and its Applications", Tata MCGraw Hill, 7th Edition 2011.
2. Venkatraman M. K., "Engineering Mathematics", 2nd Edition Volume II, National Publishing Company, 1989.
3. Veerarajan.T, "Discrete Mathematics with Graph Theory and Combinatorics", Tata MCGraw Hill, 10th Edition 2010.
4. Grewal.B.S, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition.
5. Gerald.C.F. &Wheatley.P.O, "Applied Numerical Analysis", Pearson Education, New Delhi, 2002.
6. Jain.M.K, Iyengar.S.R.K, &Jain.R.K, "Numerical Methods for Scientific and Engineering Computation, New Age International (P) Limited, Publishers, New Delhi, 3rd Edition 2002.

P18ENI1601	ENGLISH FOR PRAGMATIC USAGE	L	T	P	J	C
		0	0	2	2	2

CO 1: Impart communicative ability to exhibit the individual's subject knowledge

CO 2: Achieve the desirable communicative competence by the students to meet the expectation of corporate

CO 3: Show the need for a comprehensive link language to share subject expertise

CO 4: Offer adequate exposure to soft skills needed for the corporate.

CO 5: Sensitize towards corporate culture

COURSE ASSESSMENT METHODS

DIRECT

1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)

2. Model Examination (lab component)

3. End Semester Examination (lab components)

INDIRECT

1.Course-end survey

SPEAKING SKILL

Self-Introduction- Presentation- JAM-Topics- Shadowing (Imitation of a Native or Indian Speaker)- Role Play- Oratory

WRITING SKILL

Contextual Writing- Writing Instructions- Process Description- Transcoding Graphics-Narrative Writing- Diary Writing- Note Making

LISTENING SKILL

Listening for General Information - Level 1,2&3

READING SKILL

Reading for Pleasure – Extensive Reading

Total Hours: 30 Hrs

REFERENCES

1. Rizvi Ashraf. M., "Effective Technical Communication", Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2008.

2. Bhatnagar R.P. & Rahul Bhargava, "English for Competitive Examinations", Macmillian Publishers, India, 1989, ISBN: 9780333925591

3. Aggarwal R.S., "A Modern Approach to Verbal & Non–Verbal Reasoning", S.Chand Publishers, India, 2012, ISBN : 8121905516

		L	T	P	J	C
P18CAP1501	**C PROGRAMMING LAB**	**0**	**0**	**4**	**0**	**2**

Course Outcomes

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

CO1: Understand the fundamentals of C programming.

CO2: Choose the loops and decision making statements to solve the problem.

CO3: Implement different Operations on arrays.

CO4: Use functions ,pointers to solve the given problem

CO5: Implementstructures, unions and file operations in C programming for a given application.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
3. End Semester Examination (lab components)

INDIRECT

1.Course-end survey

1. Writing algorithms, flowcharts and pseudo codes for simple problems.
2. Programs on expressions and conversions
3. Programs using if, if-else, switch and nested if statements
4. Programs using while, do-while, for loops
5. Programs on one dimensional arrays, passing arrays to functions and array operations
6. Programs using two dimensional arrays, passing 2D arrays to functions
7. Programs using String functions
8. Programs using function calls, recursion, call by value
9. Programs on pointer operators, call by reference, pointers with arrays
10. Programs using structures and unions.
11. Programs using files.

Total Hours: 60 Hrs

P18CAP1502	MULTIMEDIA LAB	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO 1: Impart skills to create icons and logos.
CO 2: Employ special effect techniques to develop commercials.
CO 3: Develop creative animations.
CO 4: Develop a interactive multimedia courseware.
CO 5: Demonstrate audio and video editing

Pre–requisite : Nil

COURSE ASSESSMENT METHODS
DIRECT
1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
3. End Semester Examination (lab components)
INDIRECT
1.Course-end survey

1. Create attractive logos for commercial firms and icons for web-pages.
2. Create an impressive advertisement for a commercial organization.
3. Create a 3 page flyer for a technical event organized in a educational institution.
4. Create an info-graphic of any theme (Resume, Data representation, etc.).
5. Edit an image and include special effects on it.
6. Object animation.
7. Audio editing.
8. Video editing.
9. Develop an interactive courseware.
10. Multimedia application.

Total Hours: 60 Hrs

II SEMESTER

P18CAT2101	DATA STRUCTURES	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO 1	Understand the behavior of basic data structures	K2
CO 2	Explain the concepts of non linear data structures and its operations	K2
CO 3	Interpret a problem and determine the appropriate data structure for the problem	K3
CO 4	Understand the efficient storage mechanism to facilitate easy data access	K2
CO 5	Improves the logical thinking ability	K5

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

1.Continuous Assessment Test I, II
2.Assignment; Group Presentation
3. End Semester Examination

INDIRECT

1. Course-end survey

INTRODUCTION	**5 Hours**

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

ARRAYS	**7 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	**7 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	**7 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	**6 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	7 Hours
Tree Terminology – Binary Tree – Binary Tree Representation – Binary Search Tree (BST) – Creating BST – Tree Traversals – AVL Trees – Binomial Heap.	
GRAPH	**6 Hours**
Introduction – Graph Representation – Adjacency Matrix – Adjacency List – Graph Traversals – Dijkstra's algorithm – Floyd's Algorithm – Warshall's Algorithm.	
Theory: 45 Hrs Tutorial: 15 Total Hours: 60Hrs	

REFERENCES
1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2006.
2. Robert Kruse, C.L. Tondo& Bruce Leung, "Data Structures and Program Design in C", 2nd ed., Pearson Education, 4th Impression, 2009.
3. VijayalakshmiPai G.A, "Data Structures and Algorithms: Concepts Techniques and Applications", Mc Graw Hill, 2009.
4. Aaron M Tanenbaum, Moshe J Augenstein&YedidyahLangsam, "Data Structures using C and C++", PHI Learning, 2009.

P18CAI2202	DATA BASE MANAGEMENT SYSTEM	L	T	P	J	C
		3	0	2	0	4

Course Outcomes
After successful completion of this course, the students should be able to
CO 1: Use the techniques, components and tools of atypical database management system.
CO 2: Understand basic database concepts, including the structure and operation of the relational data model.
CO 3: Understand the concepts of open source databases like MySQL and MongoDB**.**
CO 4: Design and implement a small database project using open source databases.
CO 5: .Design a database information system and implement the design in SQL/NoSQL.

Pre–requisite : Nil

DIRECT
1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
5. Model Examination (lab component)
6. End Semester Examination (Theory and lab components)
INDIRECT
1.Course-end survey

INTRODUCTION	**9 Hours**
Introduction – Database Architecture – Structure of Relational Databases – Database Schema – Schema Diagrams – Relational Query Languages – Keys – Basic Structure of Queries and SQL Operations – Integrity Constraints – ER Model.	

DATABASE DESIGN	**9 Hours**
Relational Database Design – First Normal Form – Second Normal Form – Third Normal Form Boyce – Codd Normal Form – Case Study: Normalization Process – Front end and Back end – MySQL – Connectivity using ODBC.	

NoSQL	**9 Hours**
Introduction – Aggregate Data Model – Distribution Model – NoSQL Implementation: Key Value Database – Document Database – MongoDB.	

DATABASE IMPLEMENTATION	**9 Hours**
Physical Database Design and Tuning – Database Transaction: Transaction Concept and State – Concurrency Control: Two-Phase locking protocol – Recovery: Failure Classification – Log Based Recovery – Shadow Paging.	

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 Hrs	**Tutorial: -**	**Total Hours: 45 Hrs**

LIST OF EXPERIMENTS:

1. Execute Data Definition Language & Data Manipulation Language commands.
2. Demonstrate Data Control Language & Transaction Control Language commands.
3. Implement Data Query Language.
4. Execute SQL Functions.
5. Evaluate Set Operations.
6. Implement Join Operations.
7. Execute Complex and Sub Queries.
8. Create Database Objects.
9. Execution of PL/SQL Commands.
10. Record Management using Cursors.
11. Construct Functions.
12. Create Triggers.
13. Develop a Package using Database Connectivity.
14. Exercise using NoSQL Database.

otal Hours: 30 Hrs

REFERENCES :

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

P18CAT2103	COMPUTER NETWORKS	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

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

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

CO 3 : Identify the components required to build different types of networks

CO 4: Understand the network applications and protocols and network security.

CO 5: Familiarize with wireless LAN concepts.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

    1.Continuous Assessment Test I, II

    2.Assignment; Group Presentation

    3.End Semester Examination

INDIRECT

    1.Course-end survey

PHYSICAL AND DATA LINK LAYER	9 Hours

Introduction – Network Models – OSI Model – Layers in the OSI Model – TCP/IP Protocol Suite – Transmission Media –Switching – Circuit and Packet Switched Networks – Datagram Networks –Virtual Circuit Networks – Data Link Layer - Error Detection and Correction – Data Link Control – Medium Access Control – Wired and Wireless LANs – Connecting Devices – Virtual LANs.

NETWORK LAYER	9 Hours

Packet Switching – Network Layer Performance – Logical Addressing – IPv4 Addresses – IPv6 Addresses – Internet Protocol – IPv4 – IPv6 – ICMP v4 – Mobile IP – Unicast Routing.

TRANSPORT LAYER	9 Hours

Process–to–Process Delivery – Protocols – User Datagram Protocol(UDP) – Transmission Control Protocol(TCP) – Congestion Control and Quality of Service(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) –Secure Shell- Hyper Text Transfer Protocol(HTTP) – Simple Network Management Protocol(SNMP) – Security – Cryptography and Network Security.

WIRELESS LAN	9 Hours

Architectural Comparison and Characteristics – IEEE 802.11 – Bluetooth – WiMAX – Cellular Telephony – First, Second and Third Generation Cellular Networks – Satellite Networks – Mobile IP – TCP in Wireless Domain.

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

REFERENCES

1. Behrouz A. Forouzan, "Data Communication and Networking", 5th Edition, Tata McGraw Hill, 2013.
2. Andrew S.Tanenbaum, "Computer Networks", 5th Edition, Prentice Hall, 2011.
3. Larry L. Peterson & Bruce S. Davie, "Computer Networks: A Systems Approach", 5th Edition, Morgan Kaufmann Publishers, 2014.
4. James F. Kurose & Keith W. Ross "Computer Networking: A Top-Down Approach", 6th Edition. Pearson, 2013.

P18CAI2304	SOFTWARE ENGINEERING	L	T	P	J	C
		3	0	0	2	4

Course Outcomes

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

CO1	Get an insight into the processes of software development.	K2
CO2	Understand the principles and practices associated with the agile development methods.	K2
CO3	Understand the problem domain, model and design software products.	K2
CO4	Apply the business process reengineering techniques to solve problems.	K3
CO5	Implement software quality management concepts.	K3

Pre–requisite : Nil

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Viva(Project)
4. End Semester

INDIRECT

    1.Course-end survey

INTRODUCTION	8 Hours

Introduction to Software Engineering – A Generic Process Model – Prescriptive Process Models: Waterfall, Incremental, Prototyping, and Spiral Model – The Unified Process.

AGILE DEVELOPMENT	4 Hours

Agile Process – Extreme Programming (XP) – Adaptive Software Development – Scrum.

MODELING	9 Hours

Understanding Requirements – Scenario Based Requirements Modeling, Data Modeling Concepts, Class Based Requirements Modeling – Case Studies.

SOFTWARE DESIGN	10 Hours

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

QUALITY MANAGEMENT	9 Hours

Quality Concepts – Achieving Software Quality – Review Techniques – Software Configuration Management (SCM) – SCM Repository – SCM Process – Software Maintenance and Supportability.

REENGINEERING	5 Hours

Reengineering – Business Process Reengineering – Software Reengineering – Reverse Engineering – Restructuring – Case studies.

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

REFERENCES

1. Roger Pressman S, "Software Engineering: A Practitioner's Approach", 7th Edition, Tata McGraw Hill, 2010.
2. Shari Lawrence Pfleeger& Joanne M. Atlee, "Software Engineering", Pearson Education, 2010.
3. Carlo Ghezzi, Mehdi Jazayari& Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall of India, 2010.
4. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education, 2015.

P18CAP2501	DATA STRUCTURES LAB USING C	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO1	Develop skills to design and analyze simple linear and non linear data structures	K3
CO2	Design and analyze the time and space efficiency of the data structure	K4
CO3	Strengthen the ability to identify and apply the suitable data structure for the given real world problems	K3
CO4	Gain knowledge in practical applications of data structures	K2

Pre–requisite : Nil

COURSE ASSESSMENT METHODS
DIRECT
1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment
2. Model Examination
3. End Semester Examination
INDIRECT
1.Course-end survey

LIST OF EXPERIMENTS:

1. Search an element in a two dimensional array using linear search.
2. Find the element in the array using the binary search method.
3. Create a linked list and perform operations such as insert, delete, update and reverse.
4. Implement stack using array.
5. Implement stack using linked list.
6. Implement queue using array.
7. Implement queue using linked list.
8. Implement quick sort using iteration and recursion concepts.
9. Implement binary search tree.
10. Simulate various sorting algorithms.
11. Simulate various graph traversing techniques.
12. Simulate various tree traversal techniques.

Total Hours : 60 Hrs

P18CAP2502	**PYTHON PROGRAMMING LAB**	**L**	**T**	**P**	**J**	**C**
		0	**0**	**4**	**0**	**2**

Course Outcomes

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

	CO1	Develop simple python program in interactive and script mode.	**K2**	
	CO2	Solve problems using control statements in Python	**K3**	
	CO3	Construct python programs using functions and strings.	**K3**	
	CO4	Make use of python lists, set, tuples, dictionaries to represent compound data.	**K2**	
	CO5	Build python Programs to read and write data from/to files.	**K3**	
	CO6	Develop python programs to handle exceptions.	**K3**	

Pre–requisite : Nil

COURSE ASSESSMENT METHODS
DIRECT
1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
. 3. End Semester Examination (lab components)
INDIRECT
1.Course-end survey

List of Experiments:

1. Programs using expressions and input and output statements.
2. Programs using operators and built in functions.
3. Programs using conditional statements.
4. Program to exchange the values of two variables.
5. Program to test whether a given year is a leap year or not
6. Programs performing all string operations.
7. Programs using functions
8. Programs to find square root, GCD, exponentiation, sum an array of numbers
9. Programs to perform linear search, binary search
10. Programs to perform operations on list
11. Programs using dictionary and set
12. Programs to work with Tuples.
13. Programs to sort elements (Selection, Insertion, Merge, Quick)
14. Programs to search element.
15. Program to perform word count in file.
16. Program to copy file
17. Program to read and write file
18. Programs using modules and packages

Total Hours : 60 Hrs

P18ENP2501	PROFESSIONAL SKILLS I	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO 1:Develop interpersonal skills and be an effective goal oriented team player.
CO 2:Develop communication and problem solving skills.
CO 3: Impart communication ability to exhibit the individual's subject knowledge.
CO 4: Edify the expectation of corporate for desirable communication adeptness

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
. 3. End Semester Examination (lab components)

INDIRECT

1.Course-end survey

SPEAKING

Product Review- Story Development- Anecdote- Film Review- Formal Introduction of a Celebrity- Debate.

WRITING

Transcoding Graphics- Process Description- Working Mechanisms- Writing Recommendations- Comparative Writing- Analytical Writing.

LISTENING SKILL

Listening for Specific Details - Level 1,2&3.

READING SKILL

Reading for Information – Intensive Reading.

Total Hours: 30Hrs

REFERENCES

1. Rizvi Ashraf. M., Effective Technical Communication, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2008.
2. Bhatnagar R.P. & Rahul Bhargava, "English for Competitive Examinations", Macmillian Publishers, India, 1989, ISBN: 9780333925591
3.Aggarwal R.S., "A Modern Approach to Verbal & Non–Verbal Reasoning", S.Chand Publishers, India, 2012, ISBN : 8121905516

III SEMESTER

P18CAI3201	USER INTERFACE DESIGN AND DEVELOPMENT	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1: Create a basic website using HTML and Cascading Style Sheets.
CO2: Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
CO3: Design rich client presentation using AJAX.
CO4: Design and implement simple web page in PHP, and to present data in XML format.
CO5: Design front end web page and connect to the back end databases

Pre–requisite : Nil

DIRECT
1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
5. Model Examination (lab component)
6. End Semester Examination (Theory and lab components)
INDIRECT
1.Course-end survey

INTRODUCTION TO WWW	4 Hours

Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP Request – Response — Generation of Dynamic Web Pages

UI DESIGN	11 Hours

Markup Language (HTML5): Basics of Html -Syntax and Tags of Html- Introduction to HTML5 - Semantic/Structural Elements -HTML5 Style Guide and Coding Convention– Html Svg and Canvas – Html API"s - Audio & Video - Drag/Drop - Local Storage - Web Socket API– Debugging and Validating Html.
Cascading Style Sheet (CSS3): The Need for CSS – Basic Syntax and Structure Inline Styles – Embedding Style Sheets - Linking External Style Sheets - Introduction to CSS3 – Backgrounds - Manipulating text - Margins and Padding - Positioning Using CSS -Responsive Web Design - Introduction to LESS/SASS

OVERVIEW OF JAVASCRIPT	10 Hours

Introduction - Core Features - Data Types and Variables - Operators, Expressions, and Statements Functions - Objects - Array, Date and Math Related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form Validations.

ADVANCED FEATURES OF JAVASCRIPT	10 Hours

Browser Management and Media Management – Classes – Constructors – Object-Oriented Techniques in JavaScript – Object constructor and Prototyping - Sub Classes and Super Classes – Introduction to JSON – JSON Structure –Introduction to jQuery –Introduction to AJAX-Bootstrap - Bootstrap Components

PHP	10 Hours

Introduction - How Web Works - Setting up the Environment (LAMP server) - Programming Basics Print/echo - Variables and Constants – Strings and Arrays – Operators, Control Structures and Looping Structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML - Establishing Connectivity With MySQL Database

Theory: 45 Hrs	Tutorial: -	Total Hours: 45 Hrs

LIST OF EXPERIMENTS :

1. Create a web page with the following using HTML5
(i) To embed an image map in a web page
(ii) To fix the hot spots
(iii) Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Implement Client Side Scripts for Validating Web Form Controls using JavaScript.
4. Designing Quiz Application Personal Information System/ Using JavaScript
5.Write a JavaScript for Loan Calculation.
6. Develop and demonstrate a HTML file that includes JavaScript that uses functions for the following problems:
a) Parameter: A string
Output: The position in the string of the left-most vowel
b) Parameter: A number
Output: The number with its digits in the reverse order
7. Develop PHP program using Arrays, control structures, looping structures and Form Handling
8. Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.
9. Write an AJAX program for parsing a JSON file and formatting the output.
10. Develop a web application for Airline Reservation System using PHP & AJAX.

Total Hours: 30Hrs

REFERENCES

1.David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
2.Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011
3.James Lee, BrentWare , "Open Source Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP" AddisonWesley, Pearson 2009
4.Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, 2010
5.Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
6.Thomas A Powell, "Ajax: The Complete Reference", McGraw Hill, 2008

P18CAT3102	ANALYSIS OF ALGORITHMS	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO 1: Understand the behavior of algorithms.

CO 2: Explain different algorithm design strategies.

CO3: Analyze and determine the appropriate algorithm methodology for a problem.

CO 4: Apply the algorithms and design techniques to solve problems.

CO 5: Analyze the complexities of various problems in different domains.

CO 6: Evaluate the algorithms efficiency for a problem.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

INTRODUCTION	**9 Hours**

Fundamentals of Algorithm – Problem Solving –Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations – Mathematical Analysis for Recursive and Non Recursive Algorithms.

DIVIDE AND CONQUER	**9Hours**

Divide and Conquer Methodology – Merge Sort – Quick Sort – Binary Search — Multiplication of Large Integers – Strassen's Matrix Multiplication.

GREEDY METHODS	**6Hours**

Greedy Method – Prim's Algorithm – Kruskal's Algorithm –Dijkstra's Algorithm.

DYNAMIC PROGRAMMING	**8Hours**

Computing a Binomial Coefficient – Warshall's and Floyd's Algorithm –Knapsack Problem.

BACKTRACKING	**5Hours**

Backtracking – N–Queens Problem – Hamiltonian Circuit Problem – Subset Sum Problem.

BRANCH AND BOUND METHODS	**8Hours**

Branch and Bound – Assignment Problem – Knapsack Problem – Traveling Salesman Problem-P and NP Problems – NP Complete Problems

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

REFERENCES

1. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2011.

2.Thomas H.Cormen, Charles E.Leiserson, & Ronald L.Rivest, "Introduction to Algorithms", 3rd Edition Prentice Hall,MIT Press, 2009.

3. Horowitz Ellis, SartajSahni&SangutheverRajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press, 2008.

P18CAT3003	DATA MINING AND VISUALIZATION	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1: Understand the basic concepts of Data Mining
CO2: Pre-process the data for Data Mining applications
CO 3: Apply the association rules for mining the data
CO 4: Design and deploy appropriate classification techniques.
CO 5: Cluster the high dimensional data for better organization.
CO 6: Apply various techniques to visualize the data.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

    1. Continuous Assessment Test I, II
    2. Assignment; Group Presentation
    3. End Semester Examination

INDIRECT

    1. Course-end survey

DATA MINING	6 Hours

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

DATA PRE-PROCESSING	7 Hours

Introduction - Need for Data Pre-processing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

ASSOCIATION RULE MINING	5 Hours

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Item sets with and without Candidate Generation

CLASSIFICATION	4 Hours

Basic Concepts – Decision Tree - Bayesian Classification

MODEL EVALUATION AND SELECTION	4 Hours

Metrics for Evaluating Classifier Performance - Holdout Method and Random Sub sampling - Cross-Validation –ROC Curves

CLUSTER ANALYSIS	4Hours

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

OUTLIER ANALYSIS	4Hours
Introduction – Types of Outliers - Outlier Detection Methods	

MINING COMPLEX TYPES OF DATA	6 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.	

DATA VISUALIZATION	5 Hours
Introduction - Visualizing a Single Number - Pie Graph - Bar Graph - Measures of Variability - Different Visualizing Comparisons – Slopegraph - Dot Plot - Dumbbell Dot Plot	

Theory: 45 Hrs	Tutorial: -	Total Hours: 45 Hrs

REFERENCES:

1. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques" Third Edition, Elsevier, Reprinted 2012.
2. Stephanie D.H. Evergreen, "Effective Data Visualization: The Right Chart for the Right Data", SAGE Publication, 2017.
3. Berson, Alex & Smith, Stephen J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
4.G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, PrenticeHall of India, 2011
5. K.P. Soman, ShyamDiwakar and V. Ajay, "Insight into Data mining Theory and Practice", EasterEconomy Edition, Prentice Hall of India, 2006.

P18MAI3201	PROBABILITY AND STATISTICS FOR DATA ANALYSIS	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1: Understand about data collection and graphically represent data using bar chart and pie chart.

CO2: Compute various measures of central tendency and dispersion for analysis of data.

CO3: Interpret the correlation between variables and predict unknown values using regression

CO4: Explore random variables and predict probabilities for situations following normal distribution.

CO5: Comment on various hypotheses using large sample tests and Chi square test.

CO6: Examine the homogeneity of means in experiments based on one-way, two-way and Latin square classifications.

Pre–requisite : Nil

DIRECT

    1.Continuous Assessment Test I, II (Theory component)

    2.Assignment (Theory component)

    3.Demonstration etc (as applicable) (Theory component)

    4.Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)

    5.Model Examination (lab component)

    6.End Semester Examination (Theory and lab components)

INDIRECT

    1.Course-end survey

CLASSIFICATION OF DATA AND GRAPHICAL REPRESENTATION	**6 Hours**

Collection Of Data-Classification-Tabulation-Graphical Representation – Simple Bar Chart – Pie Chart.

STATISTICAL MEASURES	**10 Hours**

Measures of Central Tendency: Arithmetic Mean, Median and Mode – Measures of Variation: Range, Quartile Deviation - Standard Deviation and Coefficient of Variation – Five Number Summary – Box Plot Technique.

CORRELATION AND REGRESSION	**6 Hours**

Correlation (Discrete Data) – Scatter Diagram - Karl Pearson's Correlation Coefficient – Spearman's Rank Correlation – Regression Lines (Discrete Data).

RANDOM VARIABLES	**9 Hours**

Random Variable – Distribution Function – Properties – Probability Mass Function – Probability Density Function – Expectation - Normal Distribution.

TESTING OF HYPOTHESIS	**6 Hours**

Testing of Hypothesis for Large Samples (Single Mean, Difference of Means, Single Proportion, Difference of Proportions) - Chi-Square Test For Independence of Attributes

ANALYSIS OF VARIANCE	**8 Hours**

Analysis of Variance (ANOVA) – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Latin Square Design (LSD).

Theory: 45	Tutorial: Nil	Total Hours: 45Hrs

STATISTICAL LAB USING R-PROGRAMMING

List of Experiments
1. Introduction, Basic data representation
2. Data presentation methods - Bar Chart, Pie Chart
3. Importing data from MS-Excel
4. Mean, median, mode
5. Standard deviation, five number summary, box plot
6. Scatter diagram, correlation
7. Regression
8. Normal distribution
9. Large sample test
10. Application of Chi-Square test-independence of attributes.

<div align="right">Total Hours: 30Hrs</div>

REFERENCES
1. Gupta, S.C. and Kapoor, V. K, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 14th Edition, 2016.
2. Sharma J.K., "Operations Research", Macmillan India Ltd, Delhi, 2nd Edition, 2003.
3. Veerarajan. T., "Probability, Statistics and Random Process", Tata McGraw Hill,2003.
4. Devore, J.L., "Probability and Statistics for Engineering and Sciences", 8th Edition, Cengage Learning Pvt. Ltd., New Delhi, 2014.
5. Freund, J.E., "Mathematical Statistics", 5th Edition, Prentice Hall of India, 2001.
6. Johnson, R.A and Gupta C. B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education Int., Asia, 9th Edition, 2017.
7. Libschutz, S. "Probability and Statistics", 4th Edition, McGraw Hill, New Delhi, 2010.

P18CAI3204	PROGRAMMING WITH JAVA	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1: Apply the fundamental core java, packages, database connectivity for computing

CO2: Implement Java programs.

CO3 :Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API

CO4:Use the frameworks JSP, Hibernate, Spring

CO5: Design and implement server side programs using Servlets and JSP.

Pre–requisite : Nil

DIRECT
1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
5. Model Examination (lab component)
6. End Semester Examination (Theory and lab components)
INDIRECT
1.Course-end survey

JAVA FUNDAMENTALS	9 Hours

Java Features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Methods – Inheritance - Packages and Interfaces – Boxing, Unboxing – Variable-Length Arguments (Varargs), Exception Handling.

COLLECTIONS AND ADVANCE FEATURES	9 Hours

Utility Packages- Introduction to Collection –Hierarchy of Collection Framework – Generics, Array List, LL, HashSet, Tree Set, HashMap – Comparators – Java Annotations – Premain method.

ADVANCED JAVAPROGRAMMING	9 Hours

Input Output Packages – Inner Classes – Java Database Connectivity - Introduction JDBC Drivers - JDBC connectivity with MySQL/Oracle -Prepared Statement & Result Set – JDBC Stored Procedures Invocation - Servlets - RMI – Swing Fundamentals - Swing Classes.

OVERVIEW OF DATA RETRIEVAL &ENTERPRISE APPLICATION DEVELOPMENT	9 Hours

Tiered Application Development - Java Servers, Containers –Web Container – Creating Web Application using JSP/Servlets – Web Frameworks- Introduction to Spring/ Play Framework – ORM Layer – Introduction to Hibernate.

JAVA INTERNALS AND NETWORKING	9 Hours

Java Jar Files-Introspection – Garbage collection – Architecture and Design – GC Cleanup Process, Invoking GC, Generation in GC - Networking Basics Java and the Net – InetAddress – TCP/IP Client Sockets – URL –URL Connection – TCP/IP Server Sockets – A Caching Proxy HTTP Server – Datagrams.

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

LIST OF EXPERIMENTS
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)

Total Hours: 30Hrs

REFERENCES

1. Amritendu De, "Spring 4 and Hibernate 4: Agile Java Design and Development", McGraw-Hill Education, 2015
2. Herbert Schildt, "The Complete Reference – Java 2", Ninth Edition, Tata McGraw Hill, 2014
3. Joyce Farrell, "Java Programming", Cengage Learning, Seventh Edition, 2014
4. John Dean, Raymond Dean, "Introduction to Programming with JAVA – A Problem Solving Approach", Tata Mc Graw Hill, 2014.
5. Mahesh P. Matha, "Core Java A Comprehensive Study", Prentice Hall of India, 2011
6. R. Nageswara Rao,"Core Java: An Integrated Approach", DreamTech Press, 2016

P18ENP3501	PROFESSIONAL SKILLS–II	L	T	P	J	C
		0	0	2	0	1

CO1: Have exposure to admirable soft skills needed for the corporate.
CO2: Enhance the exteriors of one's soft skills exhibited while presenting oneself both in written and spoken communication.
CO3: Show the need for a comprehensive link language to share subject expertise
CO4: Re- engineer attitude and understand its influence on behavior.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
. 3. End Semester Examination (lab components)
INDIRECT
1.Course-end survey

SPEAKING

Moral Stories-Narration - Compering Programs- Ted Talk-I (Basic)- Ted Talk-II (Advanced)

WRITING

Report Writing- Giving Feedback- Product Review- Hints Development- Picture Perception

LISTENING SKILL

Listening Practice for International Examinations   1,2&3

READING SKILL

Reading –Cloze Test- Reading for Prediction- Inferential Reading

Total Hours: 30Hrs

REFERENCES
1. Barbara H. Foley, Elizabeth R. Neblett, English in Action, Adult & Academic ESL, 2003
2. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley,Speaking Effectively, Cambridge University Press, .1994
3. Henry I Christ, English for the College Boards, Amsco.1987

IV SEMESTER

P18CAI4201	SOFTWARE TESTING	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1	Know the inputs and deliverables of the testing process	K2
CO2	Understand the criteria for the Bug finding and reporting	K2
CO3	Apply software testing techniques for information systems development	K3
CO4	Design test cases and test plan suitable for a software development of different domains	K3
CO5	Appreciate the importance of software quality assurance	K2
CO6	Apply software standards and inspection for different domains	K3

Pre–requisite : P18CAI2304 - Software Engineering

COURSE ASSESSMENT METHODS

DIRECT

Continuous Assessment Test I, II (Theory component)
Assignment (Theory component)
Demonstration etc (as applicable) (Theory component)
Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
Model Examination (lab component)
End Semester Examination (Theory and lab components)

INDIRECT

1. Course-end survey

SOFTWARE TESTING FUNDAMENTALS	**9Hours**

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.

BUG REPORTING THE FINDINGS	**5Hours**

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	**9Hours**

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	**4Hours**

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

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.	

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

LIST OF EXPERIMENTS

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

Total Hours :30 Hrs

REFERENCES

1. Ron Patton, "Software Testing", 2nd Edition, Pearson Education, 2009.
2. Watts S. Humphrey, "Managing the Software Process", Addison Wesley, 2002.
3. Roger Pressman S, "Software Engineering: A Practitioner's Approach", 8th Edition, McGraw Hill, 2014.
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.

P18CAT4102	BIG DATA ANALYTICS	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO1	Work with big data platform and Understand the fundamentals of Various big data analysis techniques.	
CO2	Analyze the big data analytic techniques for useful business applications.	
CO3	Design efficient algorithms for mining the data from large volumes	
CO4	Analyze the HADOOP and Map Reduce technologies associated with big data analytics.	
CO5	Explore the applications of Big Data.	

Pre–requisite courses:Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
. 4. End Semester Examination (Theory)

INDIRECT

1.Course-end survey

INTRODUCTION TO BIG DATA	**9 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	**9 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.

HADOOPENVIRONMENT	**9 Hours**

History of Hadoop-The Hadoop Distributed File System –Components of Hadoop-Analyzing the Data with Hadoop -Scaling Out-Hadoop Streaming-Design of HDFS-Hadoop file systems-Java interfaces to HDFS-Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort –Task execution -Map Reduce Types and Formats-Map Reduce Features -Setting up a Hadoop Cluster -Cluster specification -Cluster Setup and Installation –Hadoop Configuration-Security in Hadoop.

DATA ANALYSIS SYTEMS AND VISUALIZATION	**9 Hours**

Link Analysis –Page Rank -Efficient Computation of Page Rank-Topic-Sensitive Page Rank –Link Spam-Recommendation Systems-A Model for Recommendation Systems-Content-Based

Recommendations -Collaborative Filtering -Dimensionality Reduction-Visualizations -Visual data analysis techniques-interaction techniques-Systems and applications.	
FRAMEWORKS AND APPLICATIONS	**9 Hours**
IBM for Big Data –Framework -Hive –Sharding –NoSQL Databases –Mango DB-Casandra-Hbase –Impala –Analyzing big data with twitter –Big data for Ecommerce –Big data for blogs.	

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", JohnWiley&Sons, 2012.
4. Zikopoulos, Paul & Chris Eaton, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", Tata McGraw Hill Publications, 2011.
5. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CambridgeUniversity Press, 2014
6. Paul Zikopoulos, DirkdeRoos , Krishnan Parasuraman ,Thomas Deutsch , James Giles , David Corrigan , Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012

P18CAI4203	WEB DEVELOPMENT	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1: Design and develop platform independent applications using a variety of component based Frameworks.

CO2: Explore the features of various platforms and frameworks used in web applications Development.

CO3: Able to implement the concepts of Hibernate, Spring for building enterprise applications.

CO4: Design and develop interactive, client-side, server-side executable web applications.

CO5: Know about integrating and building the web applications.

Pre–requisite :- Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
5. Model Examination (lab component)
6. End Semester Examination (Theory and lab components)

INDIRECT

1. Course-end survey

J2EE PLATFORM	**9 Hours**

Introduction - J2EE Architecture – Containers- J2EE Standard Services – J2EE Technologies-Using JNDI-JNDI Naming Context- Java and LDAP - LDAP operations – LDAP Information Model-LDAP Naming Model.

JSP	**12 Hours**

Introduction to Web applications – Installing Tomcat/Eclipse- JSP Tags – Implicit Objects in JSP – Request Implicit Objects in JSP – Using java classes in JSP – Interacting with HTML Forms-Sessions – Cookies – JSTL.

SPRING	**12 Hours**

Introduction – Need – Spring 5 Update – Spring Framework – Platforms – Installation – Inversion of Control – Dependency Injection in XML Configuration – Scopes and Lifecycles – Java Annotations – Spring MVC.

HIBERNATE	**12 Hours**

Introduction – Overview –Hibernate and JDBC – Development Environment –Annotations – Mapping Relations – Caching – Hibernate Query Language – Hibernate Object States / Persistence Life cycle – Get / Load – Java Persistence API.

Theory: 45 Hours	Tutorial: Nil	Total: 45 Hrs

LIST OF EXPERIMENTS:

1.Create application using Java Naming and Directory Interface.

2. Create an applications using Servlet .

3. Perform database connectivity using JDBC.

4.Use JSP tag to create an Application.

5.Illustrate an applications using Spring.

6. Write applications using Hibernate.

Total: 30 Hrs

REFERENCES

1. Craig Walls, "Spring in Action, 4th Edition Kindle Edition, Manning Publication, 2015.

2. JobineshPurushothaman, "RESTful Java Web Services" Second Edition, Packt Publishing, 2015

3. James Holmes "Struts: The Complete Reference, "2nd Edition, McGraw Hill, 2007.

4. Patrick Peak and Nick Heudecker, "Hibernate Quickly", Manning Publication, 2007.

5. SubrahmanyamAllamaraju and Cedric Buest , "Professional Java Server Programming (J2EE 1.3 Edition)", Shroff Publishers & Distributors Pvt Ltd .

6.Tony Dahbura, Rob Weltman "LDAP Programming with Java", Addison-Wesley Professional, 2000.

P18CAP4501	MOBILE APPLICATION DEVELOPMENT LAB	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO1 :Get an insight into the components and structure of mobile application development Frameworks for Android and windows OS based mobiles.

CO2: Understand how to work with various mobile application development frameworks.

CO3: Understand the basic and important design concepts and issues of development of mobile applications.

CO4: Design and Implement various mobile applications using emulators.

CO5: Deploy applications to hand-held devices

DIRECT
1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
. 3. End Semester Examination (lab components)
INDIRECT
1.Course-end survey

LAB EXERCISES

1. Develop an application that uses GUI components, Font and Colours.

2. Develop an application that uses Layout Managers and event listeners.

3. Develop a native calculator application.

4. Write an application that draws basic graphical primitives on the screen.

6. Develop an application that makes use of RSS Feed.

7. Implement an application that implements multi threading.

8. Develop a native application that uses GPS location information.

9. Implement an application that writes data to the SD card.

10. Implement an application that creates an alert upon receiving a message.

11. Write a mobile application that creates alarm clock.

Total Hours: 60Hrs

P18ENP4501	PROFESSIONAL SKILLS –III	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1:To describe a personality traits that involve communication, social graces, interpersonal relationships

CO2: To become self-confident individuals by mastering the required skills

CO3: Develop all-round personality with a mature outlook to function effectively in different circumstances

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
2. Model Examination (lab component)
. 3. End Semester Examination (lab components)

INDIRECT

1.Course-end survey

MAKING EFFECTIVE PRESENTATION

Advanced Speaking Skills – Audience analysis for Oral Presentation - Debates- Planning & Preparation –Formal Presentation -Art of Negotiation- Introduction to Placement- Corporate Culture: An Introduction- Presentation of Project- GD- levels I,II,III- Verbal Analogy- Mock Interview.

Total Hours: 30Hrs

REFERENCES

1. Barbara H. Foley, Elizabeth R. Neblett, "English in Action, Adult & Academic ESL, 2003
2. Jeremy Comfort, Pamela Rogerson, Trish Stott and Derek Utley, "Speaking Effectively", Cambridge University Press, .1994
3. Dorothy Adams, Everyday English: A Course on Communicative English, Cengage learning, 2009
4. Krishnaswamy N & Sri Raman T," Creative English for Communication", MacMillan Publication, Chennai.2009.
5. Dhanavel.S.P., English and Communication Skills for Students of Science and Engineering, Chennai, Orient Blackswan, 2009

V SEMESTER

P18CAI5301	CLOUD APPLICATION DEVELOPMENT	L	T	P	J	C
		3	0	0	2	4

Course Outcomes

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

CO1: Design and develop elegant and flexible cloud software solutions.

CO2: Manage and deploy a cloud based application.

CO3: Analyze a real world problem and develop a cloud based software solution.

CO4: Evaluate the deployment of web services from cloud architecture.

CO5: Evaluate the security issues related to the development of cloud applications.

CO6: Develop services using cloud computing.

Pre–requisite : Nil

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. Project
5. End Semester Examination (Theory and Project)

INDIRECT

1. Course-end survey

INTRODUCTION	**7Hours**

Overview – Applications – Intranets and the Cloud – First Movers in the Cloud – Benefits – Limitations – Security Concerns.

CLOUD COMPUTING TECHNOLOGY	**8Hours**

Cloud Computing Services: IaaS – PaaS – SaaS – Software Plus Services – Hardware and Infrastructure: Clients – Security – Network – Services – Accessing the cloud: Platforms – Web Applications – Web APIs – Web Browsers.

CLOUD STORAGE AND STANDARDS	**7Hours**

Cloud Storage: Overview – Cloud Storage Providers – Standards: Application – Client – Infrastructure – Service.

DEVELOPING APPLICATIONS	**9Hours**

Google : Payment – Force.com and Google – Google Gears – Microsoft : Live services – MS SQL Services – MS .NET Services – MS SharePoint Services – Dynamic CRM Services – Design – Development : Google App Engine – Salesforce.com – MS Windows Azure – Trouble Shooting – Application Management

CLOUD DESIGN	**7Hours**

Web Application Design – Machine Image Design – Privacy Design – Database Management.

CLOUD SECURITY	**7 Hours**

Data Security – Network Security – Host Security – Compromise response.

Theory: 45	Tutorial: Nil	Total Hours: 45Hrs

REFERENCES
1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw-Hill Education; FirstEdition, 2010.   2. George Reese, "Cloud Application Architectures", O'Reilly SPD, First Edition, 2010.

ELECTIVES

P18CAE0001	SERVICE ORIENTEDARCHITECTURE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1: Explain the basic principles of service oriented architecture, its components and techniques.
CO2: Compare different IT architecture.
CO3: Analyze and design SOA based applications.
CO4: Implement web service and obtain the realization of SOA.
CO5: Implement RESTful Services.
CO6: Design and implement SOA based Application Integration using BPEL.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

INTRODUCTION	**9Hours**

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	**4Hours**

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

TECHNOLOGIES OF SOA	**5Hours**

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	**9Hours**

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 IMPLEMENTATION	**9Hours**

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 ORCHESTRATION	**9Hours**

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: 45Tutorial: Nil	**Total Hours: 45Hrs**

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. WaseemRoshen, "SOA–Based Enterprise Integration", Tata McGraw–HILL, 2009.

P18CAE0002	INFORMATION SECURITY	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1: Understand the basic concepts of information security, its model and development life cycle.

CO2: Assess the need for information security and its legal, ethical and its professional issues.

CO3: Identify the information security needs

CO4: Enable planning of security solutions.

CO5: Implement and practice security policies.

Pre–requisite courses:

1. P18CAT2103 - Computer Networks

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination

INDIRECT

1. Course-end survey

INFORMATION SECURITY (IS)	**9Hours**

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	**9Hours**

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: 45Tutorial: Nil   **Total Hours: 45Hrs**

REFERENCES

1.Michael E Whitman & Herbert J Mattord, "Principles and Practices of Information Security", Cengage Learning India Private Limited, New Delhi, 2012.

2.Charles P. Pfleeger& Shari Lawrence Pfleeger, "Security in Computing" Pearson Education Pvt. Ltd., 2015.

3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2010.

P18CAE0003	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Understand the basic concepts to identify state and behavior of real world objects.	**K2**
CO2	Apply the various object oriented methodologies and choose the appropriate one for solving the problem with the help of various case studies.	**K3**
CO3	Understand the concept of analysis, design and testing to develop a document for the project.	**K2**
CO4	Implement analysis, design and testing phases in developing a project using object orientation.	**K3**
CO5	Understand and apply testing techniques for object oriented software.	**K2**

Pre–requisite : P18CAI2304 - Software Engineering

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination

INDIRECT

1. Course-end survey

INTRODUCTION	**6Hours**

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	**12Hours**

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	**9Hours**

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	**7Hours**

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	**3Hours**

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	**5Hours**
Testing Strategies – Impact of Object Orientation on Testing – Test Cases – Test Plan – Usability Testing – User Satisfaction Testing.	
Theory: 45HrsTutorial: Nil **Total Hours: 45Hrs**	

REFERENCES

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2017.
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&SarnathRamnath, "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.

P18CAE0004	GAME DEVELOPMENT	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1: Understand the concepts of Game design and development.
CO2: Analyze the processes, mechanics and issues in Game Design.
CO3: Be exposed to the Core architectures of Game Programming.
CO4: Know about Game programming platforms, frame works and engines.
CO5: Design and develop games

Pre–requisite : Nil

COURSE ASSESSMENT METHODS
DIRECT
5. Continuous Assessment Test I, II
4. Assignment; Group Presentation
5. End Semester Examination
INDIRECT
2. Course-end survey

3D GRAPHICS FOR GAME PROGRAMMING	**9 hours**

3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.

GAME ENGINE DESIGN	**9 hours**

Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.

GAME PROGRAMMING	**9 hours**

Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

GAMING PLATFORMS AND FRAMEWORKS	**9 hours**

2D and 3D Game development using Flash, DirectX, Java, Python, Game engines – DX Studio, Unity.

GAME DEVELOPMENT	**9 hours**

Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

Theory: 45Hrs Tutorial: Nil   Total Hours: 45Hrs

REFERENCES

1. Mike McShaffrfy and David Graham, "Game Coding Complete", Fourth Edition, Cengage Learning, PTR, 2012.
2. Jason Gregory, "Game Engine Architecture", CRC Press / A K Peters, 2009.
3. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" 2nd Editions, Morgan Kaufmann, 2006.

4. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2nd Edition Prentice Hall / New Riders, 2009.
5. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3rd Edition, Course Technology PTR, 2011.
6. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008.

P18CAE0005	SOFTWARE PROJECT MANAGEMENT	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Know the concepts and approaches used to manage software projects.	K2	
CO2	Understand the evaluation and estimation techniques	K2	
CO3	Know about planning, resource allocation and risks.	K2	
CO4	Apply software project management concepts to real time software projects.	K3	
CO5	Analyze project monitoring and controlling techniques to control changes.	K4	

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination

INDIRECT

1. Course-end survey

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 Hrs Tutorial: Nil **Total Hours: 45Hrs**	
REFERENCES	
- Bob Hughes, Mike Cotterell&Rajib Mall, "Software Project Management", McGraw Hill, 2012. - PankajJalote, "Software Project Management in Practice", Addison Wesley, 2002. - Robert.T.Futrell, Donald F.Shafer& Linda I.Shafer, "Quality Software Project Management", Pearson Education, Asia, 2002.	

P18CAE0006	E-COMMERCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO 1: Understand 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: Understand the theory and applications of E-commerce in business domain.
CO 5: Get an exposure to current technological advancements in E-commerce.
CO 6: Implement an E–Commerce sample site.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

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 Hrs Tutorial: Nil   **Total Hours: 45Hrs**

REFERENCES

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

P18CAE0007	**TCP/IPV6 PROTOCOL SUITE**	**L**	**T**	**P**	**J**	**C**
		3	**0**	**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.
CO 5: Understand the functionality of the process in the protocol suite

Pre–requisite courses:

P18CAI2304 - Computer Networks

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

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	**9 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 Hrs Tutorial: Nil   **Total Hours: 45Hrs**

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.

P18CAE0008	WIRELESS NETWORKS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO 1: Explain about wireless networks, protocol stack and standards.

CO 2: Conversant with the latest 3G/4G and WiMAX networks and its architecture.

CO 3: Design and implement wireless network environment for any application using latest wireless protocols and standards.

CO 4: Describe the platform architectures that are suitable for mobile computing and communications.

CO 5: Implement different type of applications for smart phones and mobile devices with latest network strategies.

CO 6: Understand various security threats and describe proposed solutions.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

WIRELESS LAN	9 Hours

Introduction-Wlan Technologies: Infrared, Uhf Narrowband, Spread Spectrum -Ieee802.11: System Architecture, Protocol Architecture, Physical Layer, Mac Layer, 802.11b, 802.11a – Hiper Lan: Watm,Bran, Hiperlan2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security - Ieee802.16-Wimax: Physical Layer, Mac, Spectrum Allocation For Wimax

MOBILE NETWORK LAYER	9 Hours

Introduction - Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling and Encapsulation, ipv6- Network Layer in the Internet- Mobile IP Session Initiation Protocol - Mobile ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

MOBILE TRANSPORT LAYER	9 Hours

TCP Enhancements for Wireless Protocols - Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications of Mobility - Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out Freezing, Selective Retransmission, Transaction Oriented TCP - TCP over 3G Wireless Networks.

WIRELESS WIDE AREA NETWORK	9 Hours

Overview of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3GSGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA) - LTE Network Architecture and Protocol.

4G NETWORKS	9 Hours

Introduction – 4g Vision – 4g Features and Challenges - Applications of 4g – 4g Technologies: Multicarrier Modulation, Smart Antenna Techniques, Ofdm-Mimo Systems, Adaptive Modulation and Coding with Time Slot Scheduler, Cognitive Radio.

Theory: 45 Hrs Tutorial: Nil	Total Hours: 45Hrs

REFERENCES

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.
2. Vijay Garg , "Wireless Communications and networking", First Edition, Elsevier 2007.
3. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
4. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
5. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013.

P18CAE0009	ETHICS IN COMPUTING	L	T	P	J	C
		3	0	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 : Nil

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination

INDIRECT

1. Course-end survey

INTRODUCTION TO COMPUTER ETHICS AND 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**

Introduction to Aspects of Computer Crime – 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 Hrs Tutorial: Nil   **Total Hours: 45Hrs**

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.

P18CAE0010	DOMAIN ANALYTICS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Know the data acquisition, transformation and visualization of the data.
CO2	Understand the need for data visualization in the organization.
CO3	Identify and evaluate appropriate data analytics techniques to be used in healthcare.
CO4	Understand the components of the social network and to apply mining algorithms in social network data.
CO5	Know various social network data and communities.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. End Semester Examination (Theory)
INDIRECT
1.Course-end survey

DATA VISUALIZATION	**6 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.

HEALTHCARE DATA ANALYTICS	**6 Hours**

Introduction - Healthcare Data Sources and Basic Analytics - Advanced Data Analytics - Applications and Practical Systems- Components of EHR - Coding Systems - Benefits of HER - Barriers to Adopting HER - Challenges of Using EHR Data

SOCIAL NETWORK ANALYSIS	**9 Hours**

Introduction to Web - Limitations of Current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key Concepts And Measures in Network Analysis - Discussion networks - Blogs and online communities - Web-based networks.

MODELING AND VISUALIZATION	**9 Hours**

Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based

Representations- Node-Link Diagrams - Hybrid Representations - Modelling and Aggregating Social Network Data – Random Walks and their Applications –Use of Hadoop and Map Reduce - Ontological Representation of Social Individuals and Relationships.

MINING COMMUNITIES	9 Hours

Aggregating and Reasoning with Social Network Data, Advanced Representations – Extracting Evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.

Theory: 45 Hrs Tutorial: Nil   **Total Hours: 45Hrs**

REFERENCES

1. Chandan K. Reddy and Charu C. Aggarwal, "Healthcare Data Analytics", CRC Press, 2015
2. Hui Yang and Eva K. Lee, "Healthcare Analytics – From Data to Knowledge to Healthcare Improvement", John Wiley & Sons, 2016.
3. Andy Kirk, "Data Visualization: A Successful Design Process", 1st Edition, Pearson, 2012.
4. Ajith Abraham, Aboul Ella Hassanien ― Computational Social Network Analysis: Trends,Tools and Research Advances, Springer, 2012
5. BorkoFurht, ―Handbook of Social Network Technologies and Applications, Springer, 1st edition, 2011

P18CAE0011	ARTIFICIAL INTELLIGENCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	Know the basics and problem solving approach to AI problems
CO2	Analyze various search strategies for a problem.
CO3	Evaluate different knowledge representation schemes for typical AI problems
CO4	Design and implement a typical AI problem to be solved Using Machine Learning Techniques.
CO5	Design and implement a futuristic AI application

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Demonstration etc (as applicable) (Theory component)
4. End Semester Examination (Theory)
INDIRECT
1.Course-end survey

INTRODUCTION	**9 Hours**

Introduction – Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI Problems.

PROBLEM SOLVING METHODS	**9 Hours**

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics – Local Search Algorithms and Optimization Problems - Searching with Partial Observations -Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search – Game Playing -Optimal Decisions in Games -Alpha--Beta Pruning -Stochastic Games.

KNOWLEDGE REPRESENTATION	**9 Hours**

First Order Predicate Logic – Prolog Programming - Unification -Forward Chaining –Backward Chaining - Resolution –Knowledge Representation - Ontological Engineering - Categories and Objects –Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

MACHINE LEARNING	**9 Hours**

Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning -Supervised Learning - Learning Decision Trees - Regression and Classification with Linear Models - Artificial Neural Networks - Nonparametric Models - Support Vector Machines -Statistical Learning - Learning with Complete Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning.

APPLICATIONS	9 Hours

AI applications – Language Models - Information Retrieval - Information Extraction – Natural Language Processing - Machine Translation – Speech recognition – Robot – Hardware – Perception – Planning – Moving .

Theory: 45 Hrs Tutorial: Nil   **Total Hours: 45Hrs**

REFERENCES

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2016.

2. I. Bratko, Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

3. Gerhard Weiss, Multi Agent Systems, Second Edition, MIT Press, 2013.

P18CAE0012	ACCOUNTING AND FINANCIAL MANAGEMENT	L	T	P	J	C
		3	0	0	0	3

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 cost sheet, 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: Ensures the factors to be considered in investment policies.
CO 6: Estimate the various business activities such as purchase, sale, production and cash budgets.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT
Continuous Assessment Test I, II
Assignment; Group Presentation
End Semester Examination
INDIRECT
Course-end survey

FINANCIAL ACCOUNTING	**9 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	**9 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	**9 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	**9 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	**9 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 Hrs Tutorial: Nil	**Total Hours: 45Hrs**

REFERENCES

1. S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 2015.
2. R.K Sharma and Shashi V. K.Gupta, "Management Accounting: Principles of Practice", Kalyani Publishers, 2015.
3. I.M.Pandey, "Financial Management", Vikas Publications, 2014.
4. S.P.Iyengar, "Cost and Management Accounting", Sultan Chand & Co, 2014.

5. I.M.Pandey, "Elements of Management Accounting", Vikas Publishing House, 2014.
6. R.L Gupta and V.K.Gupta, "Financial Accounting", Sultan Chand & Sons, 2015.

P18CAE0013	ENTERPRISE RESOURCE PLANNING	L	T	P	J	C
		3	0	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.

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.

CO 5: Should able know the architecture concepts and services of an ERP package

Pre–requisite courses: Nil

COURSE ASSESSMENT METHODS

DIRECT
Continuous Assessment Test I, II
Assignment; Group Presentation
End Semester Examination
INDIRECT
Course-end survey

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 Hrs Tutorial: Nil   **Total Hours: 45Hrs**

REFERENCES

1. Vinod Kumar Garg &N.K.Venkita Krishnan, "Enterprise Resource Planning – Concepts and Practice", PHI Learning Pvt. Ltd., 2011.

2. Jose Antonio Fernandz, "The SAP R/3 Handbook", TMH, 2005.

P18CAE0014	MANAGING TECHNICAL PEOPLE	L	T	P	J	C
		3	0	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: Know the basic legal and conceptual framework for managers

CO 5: Understand about the programmers and their work culture.

Pre–requisite : Nil

COURSE ASSESSMENT METHODS

DIRECT

1.Continuous Assessment Test I, II

2.Assignment; Group Presentation

3.End Semester Examination

INDIRECT

1. Course-end survey

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: Nil** **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.	

ONE CREDIT COURSES

P18CAC0201	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 : Nil
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. VenkatSubramaniam& 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.

P18CAC0202	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 : Nil

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. ZigurdMednieks, Laird Dornin, Blake Meike G & Masumi Nakamura, "Programming Android", O'Reily Books, 2011.

P18CAC0203	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 : Nil

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.

P18CAC0204	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.

P18CAC0205	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.

P18CAC0206	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.

P18CAC0207	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.

P18CAC0208	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.

P18CAC0209	DATA ANALYTICS

Course Outcomes
After successful completion of this course, the students should be able to
CO1: Analyze and interpret data using an ethically responsible approach.   CO2: Use appropriate models of analysis, assess the quality of input, derive insight from results, and investigate potential issues.   CO3: Interpret data findings effectively to any audience, orally, visually and in written formats
Pre-requisite Courses : Nil
Basic Analysis Techniques-Statistical Hypothesis Generation and Testing-Chi-Square Test – T – TestAnalysis of Variance-Correlation Analysis-Maximum Likelihood Test-Practice and Analysis with R-Data Analysis Techniques-Regression Analysis-Classification Techniques—Clustering-Association Rules Analysis-Practice and Analysis with R

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

REFERENCES
1. RajendraAkerkar**&**Priti Srinivas Sajja, Intelligent Techniques for Data Science Springer International Publishing 2016.

P18CAC0210	**PHP WITH LARAVEL FRAMEWORK**

Course Outcomes
After successful completion of this course, the students should be able to
CO1: PHP Basic syntax for variable types and calculations and to create conditional structure. CO2: Understanding POST and GET in form submission. CO3: Build simple solid web applications with Laravel framework
Introduction- Environment Setup- Variables, Constants and Operators- Conditional, Looping and Loop Control Statements- Web Concepts – GET and POST Methods- Files and I/O -Functions Regular Expressions- Error Handling- Database Connectivity- Working with AJAX- Object Oriented PHP- Exercises - Introduction to Laravel Framework

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

REFERENCES
1. Robin Nixon, Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5,O'Reilly Media,2015 2. Martin Bean, Laravel 5 Essentials, PACKT Publications, 2015