NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)
Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585

Curriculum and Syllabus
for
Master of Computer Applications [R17]

(This Curriculum and Syllabi are applicable to the Students admitted from the academic year (2017-2018) to (2019-2020))

SEPTEMBER 2021

Dr.N.Rengarajan, B.Sc., B.Tech., M.E., Ph.D.,
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MCA Department PEOs and POs

PROGRAMME EDUCATIONAL OBJECTIVEs:

PEO1: To excel in fundamentals, problem solving and programming skills in the various computing fields of IT Industries or for to pursue higher studies in the fields of teaching and research.

PEO2: To demonstrate the capabilities in scientific knowledge, logical thinking and fundamental concepts of Computer Application.

PEO3: To develop the ability to plan, analyze, design, code, test, implement & maintain software products for real time system.

PEO4: To experience the students in finding solutions and developing system based applications for real time problems in various domains involving technical, managerial, entrepreneurial, economical & social constraints.

PROGRAMME OUTCOMES:

At the end of a programme a students will be able to demonstrate ability to

a-l	GRADUATE ATTRIBUTEs	PO No.	PROGRAMME OUTCOMEs
a	Multidisciplinary Knowledge	PO1	Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.
b	Investigative and Analytical Skills	PO2	Identify, Analyze the computing requirements of a problem and solve those using computing principles.
c	Design and Development of Solutions	PO3	Design and Evaluate a computer based system, components and process to meet the specific needs of applications.
d	Lifelong Learning	PO4	Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
e	Managerial and Leadership Skill	PO5	Apply understanding of management principles with computing knowledge to manage projects in multidisciplinary environments.
f	Communication	PO6	Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
g	Ethical, Environmental Concern and Social Responsible, Sustainability	PO7	Understand economical, environmental, social, health, legal, ethical issues within local and global contexts and consequential responsibilities relevant to professional practice.
h	Individual and Team Work	PO8	Function effectively in a team environment to accomplish a common goal.
i	Project Management and Finance	PO9	Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
j	Research and Consultancy	PO10	Use knowledge to analyze, interpret the data and synthesis the information to derive valid conclusions using research methods.
k	Modern Tool Usage	PO11	Ability to use the techniques, skills, and be familiar with modern software tools necessary for Computer Application practice.
l	Proficiency	PO12	Expertise in developing application with required domain knowledge.

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PROGRAMME SPECIFIC OUTCOMES:

PSO1: Ability to understand the principles and working of software aspects in the computer system.

PSO2: Ability to demonstrate knowledge in mathematical models, algorithms and software development methodologies.

PSO3: Ability to develop practical competency in programming languages and open source platforms.

PSO4: Ability to provide a foundation for research and entrepreneurship.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	3	3	3	1	1	1	2	1	3	1	2
2	3	3	3	2	1	2	1	3	3	2	3	3
3	3	3	3	3	3	3	2	3	3	3	3	3
4	3	3	3	2	3	2	2	3	2	3	3	3

MAPPING OF PROGRAM SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Objectives and the outcomes is given in the following table

PROGRAMME SPECIFIC OUTCOMES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	3	3	3	1	2	1	1	1	1	1	2
2	3	3	3	2	1	1	1	3	3	2	2	2
3	3	3	3	2	2	3	2	3	3	3	3	3
4	3	3	2	3	3	3	2	3	3	3	3	3

***Contribution** **1: Reasonable** **2: Significant** **3: Strong**

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REGULATIONS – 2017 CHOICE BASED CREDIT SYSTEM

MASTER OF COMPUTER APPLICATIONS

CURRICULA: I – VI SEMESTERS SYLLABI: I – VI SEMESTERS

SEMESTER: I									
SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAA01	Mathematical Foundations of Computer Science	FC	NIL	5	3	2	0	4
2	17CAB01	Problem Solving Techniques and C	PC	NIL	3	3	0	0	3
3	17CAB02	PC Hardware and Troubleshooting	PC	NIL	3	3	0	0	3
4	17CAB03	Web Design Essentials	PC	NIL	5	3	0	2	4
5	17CAA02	Accounting and Financial Management	FC	NIL	3	3	0	0	3
PRACTICALS									
6	17CAP01	C Programming Laboratory	PC	NIL	4	0	0	4	2
7	17CAP02	Office Automation Laboratory	PC	NIL	2	0	0	2	1
8	17CAE01	Functional English-I	EEC	NIL	2	0	0	2	1
				TOTAL	27	15	2	10	21

SEMESTER: II									
SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAB04	Software Engineering	PC	NIL	3	3	0	0	3
2	17CAA03	Essentials of Management	FC	NIL	3	3	0	0	3
3	17CAB05	Computer Architecture and Organization	PC	17CAB02	3	3	0	0	3
4	17CAB06	Data Structures	PC	17CAB01	3	3	0	0	3
5	17CAB07	Operating Systems	PC	NIL	5	3	0	2	4
PRACTICALS									
6	17CAP03	Software Engineering Laboratory	PC	NIL	4	0	0	4	2
7	17CAP04	Data Structures Laboratory	PC	17CAP01	4	0	0	4	2
8	17CAE02	Functional English-II	EEC	17CAE01	2	0	0	2	1
				TOTAL	27	15	0	12	21

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SEMESTER: III									
SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAA04	Resource Management Techniques and Statistics	FC	NIL	3	3	0	0	3
2	17CAB08	Database Management Systems	PC	NIL	3	3	0	0	3
3	17CAB09	Computer Networks	PC	NIL	3	3	0	0	3
4	17CAB10	Analysis of Algorithm and Design	PC	NIL	3	3	0	0	3
5	E1	Elective – I	PE	NIL	4	2	0	2	3
PRACTICALS									
6	17CAP05	Database Management Systems Laboratory	PC	NIL	4	0	0	4	2
7	17CAP06	Analysis of Algorithm and Design Laboratory	PC	NIL	4	0	0	4	2
8	17CAE03	Career Development Skills – I	EEC	NIL	2	0	0	2	1
				TOTAL	26	14	0	12	20

SEMESTER: IV									
SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAB11	Data Mining and Data Warehousing	PC	17CAB08	3	3	0	0	3
2	17CAB13	Web Programming	PC	NIL	3	3	0	0	3
3	E2	Elective II	PE	E1	4	2	0	2	3
4	E3	Elective III	PE	NIL	3	3	0	0	3
5	E4	Elective IV	PE / OE	NIL	3	3	0	0	3
PRACTICALS									
6	17CAP07	Web Programming Laboratory	PC	NIL	4	0	0	4	2
7	E3L	Elective III Laboratory	PC	NIL	4	0	0	4	2
8	17CAE04	Career Development Skills – II	EEC	17CAE03	2	0	0	2	1
				TOTAL	26	14	0	12	20

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SEMESTER: V									
SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAB14	Big Data Analytics	PC	17CAB11	3	3	0	0	3
2	17CAB15	Machine Learning	PC	17CAB11	3	3	0	0	3
3	17CAB16	Software Project Management	PC	NIL	3	3	0	0	3
4	17CAB12	Cyber Security	PC	17CAB09	3	3	0	0	3
5	E5	Elective V	PE	NIL	3	3	0	0	3
PRACTICALS									
6	17CAP08	Big Data Analytics Laboratory	PC	NIL	4	0	0	4	2
7	17CAP09	Machine Learning Laboratory	PC	NIL	4	0	0	4	2
8	17CAE05	Mini Project	EEC	NIL	4	0	0	4	2
				TOTAL	27	15	0	12	21

SEMESTER: VI									
SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
PRACTICALS									
1	17CAE06	Project Work	EEC	17CAE05	24	0	0	24	12
				TOTAL	24	0	0	24	12

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FOUNDATION COURSES (FC)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAA01	Mathematical Foundations of Computer Science	FC	NIL	5	3	2	0	4
2	17CAA02	Accounting and Financial Management	FC	NIL	3	3	0	0	3
3	17CAA03	Essentials of Management	FC	NIL	3	3	0	0	3
4	17CAA04	Resource Management Techniques and Statistics	FC	NIL	3	3	0	0	3

PROFESSIONAL CORE (PC)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAB01	Problem Solving Techniques and C	PC	NIL	3	3	0	0	3
2	17CAB02	PC Hardware and Troubleshooting	PC	NIL	3	3	0	0	3
3	17CAB03	Web Design Essentials	PC	NIL	5	3	0	2	4
4	17CAB04	Software Engineering	PC	NIL	3	3	0	0	3
5	17CAB05	Computer Architecture and Organization	PC	17CAB02	3	3	0	0	3
6	17CAB06	Data Structures	PC	17CAB01	3	3	0	0	3
7	17CAB07	Operating Systems	PC	NIL	5	3	0	2	4
8	17CAB08	Database Management Systems	PC	NIL	3	3	0	0	3
9	17CAB09	Computer Networks	PC	NIL	3	3	0	0	3
10	17CAB10	Analysis of Algorithm and Design	PC	NIL	3	3	0	0	3
11	17CAB11	Data Mining and Data Warehousing	PC	17CAB08	3	3	0	0	3
12	17CAB12	Cyber Security	PC	17CAB09	3	3	0	0	3
13	17CAB13	Web Programming	PC	NIL	3	3	0	0	3
14	17CAB14	Big Data Analytics	PC	17CAB11	3	3	0	0	3
15	17CAB15	Machine Learning	PC	17CAB11	3	3	0	0	3
16	17CAB16	Software Project Management	PC	NIL	3	3	0	0	3

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PROFESSIONAL ELECTIVES (PE) –EMBEDDED COURSE (E1& E2)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY & LAB									
1	17CAX01	Object Oriented Programming in Java – I	PE	NIL	4	2	0	2	3
2	17CAX02	Python Programming	PE	NIL	4	2	0	2	3
3	17CAX03	C# and .Net Framework	PE	NIL	4	2	0	2	3
4	17CAX04	Unix and Network Programming	PE	NIL	4	2	0	2	3
5	17CAX05	Object Oriented Programming in Java – II	PE	17CAX01	4	2	0	2	3
6	17CAX06	Object Oriented Programming with Python	PE	17CAX02	4	2	0	2	3
7	17CAX07	Ruby on Rails Framework	PE	17CAX01 / 17CAX02	4	2	0	2	3
8	17CAX08	XML & Web Services	PE	17CAB13	4	2	0	2	3
9	17CAX28	Problem Solving and Algorithmic Skills	PE	NIL	4	2	0	2	3

PROFESSIONAL ELECTIVES (PE) – E3

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAX09	Mobile Apps Development	PE	NIL	3	3	0	0	3
2	17CAX10	Cloud Suite Business and Syteline Environment	PE	NIL	3	3	0	0	3
3	17CAX11	Internet of Things and its applications	PE	NIL	3	3	0	0	3
4	17CAX29	Data Science Techniques	PE	NIL	3	3	0	0	3

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
LABORATORY									
1	17CAW01	Mobile Apps Development Laboratory	PE	NIL	4	0	0	4	2
2	17CAW02	Cloud Suite Business and Syteline Environment Laboratory	PE	NIL	4	0	0	4	2
3	17CAW03	Internet of Things Laboratory	PE	NIL	4	0	0	4	2
4	17CAW04	Data Science Techniques Laboratory	PE	NIL	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
THEORY									
1	17CAX12	Professional Ethics	PE	NIL	3	3	0	0	3
2	17CAX13	Cloud Computing	PE	NIL	3	3	0	0	3
3	17CAX14	Business Intelligence	PE	NIL	3	3	0	0	3
4	17CAX15	Organizational Behavior and Entrepreneurship	PE	NIL	3	3	0	0	3
5	17CAX16	Software Testing	PE	NIL	3	3	0	0	3
6	17CAX17	Cryptography and Network Security	PE	17CAB09	3	3	0	0	3
7	17CAX18	Mobile Computing	PE	NIL	3	3	0	0	3
8	17CAX19	Health Care Management	PE	NIL	3	3	0	0	3
9	17CAX20	Technical Documentation	PE	NIL	3	3	0	0	3
10	17CAX21	Database Administration	PE	17CAB08	3	3	0	0	3
11	17CAX22	Social Network Analysis	PE	NIL	3	3	0	0	3
12	17CAX23	Object Oriented Analysis and Design	PE	NIL	3	3	0	0	3
13	17CAX24	Advanced Database Management Systems	PE	17CAB08	3	3	0	0	3
14	17CAX25	Web Server Administration	PE	NIL	3	3	0	0	3
15	17CAX26	Compiler Design	PE	NIL	3	3	0	0	3
16	17CAX27	Distributed Computing	PE	17CAB07, 17CAB09	3	3	0	0	3

OPEN ELECTIVE (OE)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
LABORATORY									
1	17CAO01	Employability Enhancement and Analytical Skills	OE	NIL	3	0	0	6	3

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EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PREREQUISITE	CONTACT PERIODS	L	T	P	C
PRACTICALS									
1	17CAE01	Functional English-I	EEC	NIL	2	0	0	2	1
2	17CAE02	Functional English-II	EEC	17CAE01	2	0	0	2	1
3	17CAE03	Career Development Skills – I	EEC	NIL	2	0	0	2	1
4	17CAE04	Career Development Skills – II	EEC	17CAE03	2	0	0	2	1
5	17CAE05	Mini Project	EEC	NIL	4	0	0	4	2
6	17CAE06	Project Work	EEC	17CAE05	24	0	0	24	12

SUMMARY

SL. No.	SUBJECT AREA	CREDITS AS PER SEMESTER						CREDITS TOTAL
		I	II	III	IV	V	VI	
1	FC	7	3	3	0	0	0	13
2	PC	13	17	13	13	13	0	69
3	PE	0	0	3	6	6	0	15
4	EEC	1	1	1	1	2	12	18
CREDITS TOTAL		21	21	20	20	21	12	115

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17CAA01 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE					
		L	T	P	C
		3	2	0	4
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To develop the use of matrix algebra techniques those are needed by engineers for practical applications	1.1	To develop the use of matrix algebra techniques.	a,d,h,i,k	
2.0	Be exposed to concepts and properties of set theory	2.1	Show mathematical reasoning and arrive at conclusions about sets	a,b,d,h,i	
3.0	To understand the basic concepts of logic and their applications	3.1	Infer whether a logical argument is valid from the given set of premises by applying the inference rules of Propositions & predicate calculus	a,c,d,h,i	
4.0	Be exposed to concepts and properties of functions	4.1	Be exposed to concepts and properties of functions and relations	a,c,d,h,i	
5.0	To earn the foundations of automata theory, computability theory and complexity theory.	5.1	To earn the foundations of automata theory, computability theory	a,b,c,d,k	

UNIT I -MATRIX ALGEBRA **(9+3)**

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

UNIT II - BASIC SET THEORY **(9+3)**

Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - partitions- Permutation and Combination

UNIT III-MATHEMATICAL LOGIC **(9+3)**

Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives – Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus – Predicate calculus.

UNIT IV -FUNCTIONS & RELATIONS **(9+3)**

Relations-Properties of relations - Matrices of relations - Closure operations on relations -Functions - injective, surjective and bijective functions.

UNIT V-FORMAL LANGUAGE & FINITE STATE AUTOMATA **(9+3)**

Languages and Grammars-Phrase Structure Grammar-Classification of Grammars-Pumping Lemma For Regular Languages-Context Free Languages. Finite State Automata-Deterministic Finite State Automata (DFA), Non Deterministic Finite State Automata (NFA)- Equivalence of DFA and NFA-Equivalence of NFA and Regular Languages.

TOTAL (L: 45+T:15) = 60 PERIODS

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REFERENCES:

1. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002. (Unit 1,2 & 3).
2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4, 5).
3. A.Tamilarasi&A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, 2nd Edition 2005.
4. M.K.Venkataraman "Engineering Mathematics", Volume II, National Publishing Company, 2nd Edition, 1989.

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17CAB01 PROBLEM SOLVING TECHNIQUES AND C					
			L	T	P	C
			3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To provide a clear knowledge about the Problem Solving.	1.1	Able to know how to solve the Problem.	a,b,c,k,l	
2.0	To learn how to execute Factoring methods. .	2.1	Able to implement Factoring methods.	a,b,c,k,l	
3.0	To learn about basic knowledge of C Language.	3.1	Able to understand basic concepts of C Language.	a,b,c,k,l	
4.0	To learn about Arrays, Functions, Structures and Unions.	4.1	Implement program for arrays, Functions, Structures and Unions.	b,c,k,j,l	
5.0	To provide the knowledge about Pointers.	5.1	Able to use pointers and implement it.	b,c,k,j,l	

UNIT I -INTRODUCTION TO COMPUTER PROBLEM-SOLVING **(9)**

Introduction – The Problem-Solving Aspect – Top-down Design-Implementation of Algorithms - Program Verification – The Efficiency of Algorithms- Analysis of Algorithms. Fundamental Algorithms – Exchanging the values of Two Variables – Counting – Summation of set of Numbers – Factorial Computation-Sine function computation– Generation of the Fibonacci sequence – Reversing the Digits of an Integer – Base Conversion - Character to Number conversion.

UNIT II - FACTORING METHODS **(9)**

Finding the square Root of a number – The Smallest Divisor of an Integer – The Greatest Common Divisor of Two Integers – Generating Prime Numbers – Computing the Prime Factors of an Integer Generation of Pseudo–random Numbers – Raising a Number to a Large Power – Computing the nth Fibonacci Number.

UNIT III- INTRODUCTION TO C LANGUAGE **(9)**

Overview of 'C' language – Constants, Variables and Data Types – Operators, Expressions and Assignment statements – Managing Input/output Operations – Formatted I/O – Decision Making –Branching – IF , Nested IF – Switch – go to – Looping – while, do, for statements.

UNIT IV - ARRAYS, FUNCTIONS, STRUCTURES AND UNIONS **(9)**

Arrays – Dynamic and multi-dimensional arrays – Character arrays and Strings. Functions- String handling Functions – User defined Functions–Categories of Functions–Recursion. Introduction to Structures and Unions.

UNIT V- POINTERS **(9)**

Pointers – Declaration, Accessing a variable, dynamic memory allocation, Array of Pointers, Pointers of functions and Structure Pointers.

TOTAL :(L: 45) = 45 PERIODS

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1. R.G. Dromey, " How to solve it by Computer ", Pearson Education, India, 2007.
2. YashavantP.Kanetkar, " Let us C", Infinity Science Press, Eighth Edition, 2008.
3. Kamthane, Ashok N, "Programming in C", Pearson Education, Second Edition, 2013.

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17CAB02 PC HARDWARE AND TROUBLESHOOTING					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To provide a clear knowledge about fundamentals of PC Hardware.	1.1	Understand about motherboard and I/O interfaces.	b,c,d,k,l
2.0	To learn about various PC Hardware Devices.	2.1	Able to understand the working of Peripheral Devices.	b,c,d,k,l
3.0	To learn about processors.	3.1	Able to get knowledge about various processors and its types.	a,b,c,d,k
4.0	To learn the Installation, Maintenance and Troubleshooting.	4.1	Able to know about how to install, maintain the system.	b,c,d,e,l
5.0	To provide the knowledge about troubleshooting.	5.1	Able to know about how to troubleshoot to solve problem in system.	a,b,d,k,l

UNIT I - PC HARDWARE OVERVIEW **(9)**

Introduction to PC – Hardware BIOS-DOS Interaction – PC Family – PC Hardware – Inside the System Box – Motherboard Logic – Memory Space – I/O Port Addresses – Wait State – Interrupts – I/O Data Transfer – Interfaces : I/O Interfaces – Keyboard – Parallel – Serial. Controller: CRT Display Controller – FDC – HDC – Overview of Advanced PCs.

UNIT II - PERIPHERAL DEVICES **(9)**

Keyboard – Monitors : Display Specifications – CRT Display – LCD & LED Technology – Touch Screens – Plasma Display Technology – LCD & DLP Projectors – Printers – Magnetic Storage Devices – FDD – HDD – Mouse & Track Ball – CD-ROM Drive – Scanner – Digital Camera – DVD – USB Flash Drive.

UNIT III- PROCESSORS **(9)**

Processor Specifications – Processor Features – Intel Pentium 4 – Intel Core Processors – AMD Processors : K6 Processors – K7 Processors – K8 Processors – K10 Processors – Over clocking – Processor Cooling.

UNIT IV - INSTALLATION AND PREVENTIVE MAINTENANCE **(9)**

PC System Configuration – Pre-Installation Planning – Installation Practice – Routine Checks – PC Assembling and Integration – BIOS Setup – Preventing Maintenance – DOS - Virus – Data Recovery.

UNIT V- TROUBLE SHOOTING **(9)**

Computer Faults : Nature – Types – Diagnostic Programs & Tools – Bus Faults – Faults Elimination Process – Systematic Troubleshooting: Symptoms Observation – Symptoms Analysis – Fault Diagnosis – Fault Rectification – Troubleshooting Levels – POST – Motherboard Problems Diagnosis – Printer Interface Problems – HDD Problems – CD-ROM Drive Problems.

TOTAL :(L: 45) = 45 PERIODS

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REFERENCES:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", Second Edition, TMH, 2002.
2. Scott Mueller, "Upgrading and Repairing PCs", Twenty Second Edition, 2016.

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17CAB03 WEB DESIGN ESSENTIALS					
		L	T	P	C
		3	0	2	4
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn basic concepts of Internet and Web.	1.1	To acquire basic knowledge about the Internet and Web Concepts.	b,c,d,e,f	
2.0	To learn about HTML Basics and its tags.	2.1	Able to create own web pages using HTML Tags.	a,b,c,k,l	
3.0	To provide deep knowledge about Cascading Style Sheet.	3.1	Able to enhance the webpage using CSS.	a,b,c,k,l	
4.0	To get familiarize with Java Script.	4.1	To implement Java Script in web page.	a,b,c,k,l	
5.0	To learn about web hosting.	5.1	To get knowledge about testing, validating and hosting the website.	a,b,c,i,l	

UNIT I - INTRODUCTION TO WEB DEVELOPMENT **(9)**

Internet Principles: Introduction to Internet – Origin of Internet – IP Address – Internet Service Provider – URL. Basic Web Concepts: Internet Servers – World Wide Web - Elements of WWW – Intranet. Client/Server Model: Building Entities of Client/Server model – Varies Client/Server Model. Retrieving data from Internet: Retrieving Picture and Sound – Downloading Audio and Video – Biographic Style – Protocols.

UNIT II – HTML **(9)**

Introduction – HTML Elements – Attributes – Headings – Paragraphs - Formatting – Fonts - Colors – Styles – Links – Images – Tables – Lists – Forms – Frames – Layouts.

UNIT III - CASCADING STYLE SHEETS **(9)**

Evolution of CSS – External Style Sheets – Embedding Style Sheets – Inline Style Sheets - CSS Comments – Grouping – Class and ID selectors – Limitations – Browser Compatibility.

UNIT IV - JAVA SCRIPT **(9)**

Introduction – Java vs JavaScript – Embedding JavaScript in HTML – Data Values – Variables – Literals – Expressions – Operators – Object Model – Built-in objects – Built-in functions – Cookies.

UNIT V - PUTTING WEBSITE ON THE WEB **(9)**

Meta Tags: Name and Content Attributes – http-equiv and content – Scheme Attribute. Testing Site: Importance of Directory Structure and Relative URLs – Validating HTML, XHTML and CSS – Link Checking – Screen Resolution and Color Depths – Accessibility Checkers – Development Server – Different Versions of Browsers – Getting a Domain Name – Hosting.

REFERENCES:

1. Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web How to program", Fifth Edition, Pearson Education, 2011.
2. Jon Duckett "Beginning Web Programming with HTML, XHTML and CSS", Second Edition, Wiley Indian Pvt. Ltd, 2012.

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LIST OF EXPERIMENTS

1. Acquaintance with elements, Tags and basic structure of HTML files.
2. Practicing basic and advanced text formatting.
3. Practicing use of multimedia components (Image, Video & Sound) in HTML document.
4. Designing of webpage-Working with List.
5. Designing of webpage-Working with Tables.
6. Practicing Hyper linking of web pages.
7. Designing of Webpage-Document Layout.
8. Designing of Webpage-Working with Frames.
9. Designing of Webpage-Working with Forms and Controls.
10. Acquaintance with creating style sheet, CSS properties and styling.

TOTAL (L: 45+T:30) = 75 PERIODS

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17CAA02 ACCOUNTING AND FINANCIAL MANAGEMENT					
			L	T	P	C
			3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes			Related Programme Outcomes
1.0	To acquire a reasonable knowledge in Accounts	1.1	Prepare and Analyze the Financial Statement to determine Optimal Managerial Decisions.		a,b,d,e,j
2.0	To learn analysis and evaluate Financial Statements	2.1	Apply and Analyze different types of Financial Management tools through the preparation of Estimates.		a,b,c,d,i
3.0	To learn about cost accounting	3.1	Understand about classification of cost and cost sheet preparation.		a,b,c,g,i
4.0	To acquire knowledge about budget	4.1	Able to understand about budget and budgeting control.		b,c,e,g,i
5.0	To learn about investment decision in financial management.	5.1	Understand about financial management and capital budgeting techniques.		b,c,e,g,i

UNIT I -FINANCIAL ACCOUNTING **(9)**

Meaning and Scope of Accounting – Accounting Principles: Concepts and Conventions – Accounting Standards – Trial Balance – Final Accounts: Trading Account, Profit and Loss Account and Balance Sheet.

UNIT II - RATIO ANALYSIS **(9)**

Introduction to Financial Statement analysis – Ratio Analysis: Classification of Ratios: Profitability Ratios, Liquidity Ratios, Solvency Ratios and Turnover Ratios – Advantages and Limitations of Ratio Analysis.

UNIT III-COST ACCOUNTING **(9)**

Meaning and Objectives – Classification of cost – Elements of Cost – Cost Sheet preparation – Break Even Analysis.

UNIT IV -BUDGET AND BUDGETING CONTROL **(9)**

Meaning, Objectives and Significance – Types of Budget: Flexible Budget, Cash Budget and Functional Budgets – Introduction to Master Budget and Zero Base Budgeting.

UNIT V- INVESTMENT DECISION IN FINANCIAL MANAGEMENT **(9)**

Objectives and Functions of Financial Management – Risk-Return Relationship -Time Value of Money Concepts – Capital Budgeting Techniques: Payback period, Accounting Rate of Return, Net Present Value.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. JiamBalvo James, "Management Accounting", Wiley Publication, New Delhi, 2010.
2. Jain, Khan, "Financial Management", Tata McGraw Hill, 2011.
3. Murthy A., Gurusamy S., "Cost Accounting", Second Edition, Tata McGraw Hill, 2009.
4. Rajasekaran, Lalitha, "Cost Accounting", Pearson Education, 2011.
5. Brigham, "Fundamentals of Financial Management", Thomson, Singapore.

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17CAP01 C PROGRAMMING LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn basic concepts of 'C' language for developing program.	1.1	To develop programs using the C language.	a,b,c,k,l	
2.0	To learn about functions, arrays, and pointers concepts.	2.1	To write programs using of arrays and functions.	a,b,c,k,l	
3.0	To understand about structures.	3.1	Able to implement structures in program.	a,b,c,k,l	
4.0	To gain knowledge about recursive concept.	4.1	Able to use and apply knowledge of recursive function.	b,c,k,j,l	
5.0	To familiarize designing and developing pointers.	5.1	To get a deep practical knowledge about the pointers.	b,c,k,j,l	

1. Display the following:
   (i) Floyd's triangle
   (ii) Pascal Triangle
2. Generate the following series of numbers:
   (i) Armstrong numbers between 1 to 100
   (ii) Prime numbers between 1 to 50
   (iii) ibonacci series up to N numbers
3. Manipulate the strings with following operations.
   (i) Concatenating two strings
   (ii) Reversing the string
   (iii) inding the substring
   (iv) Replacing a string
   (v) Finding length of the string
4. Find the summation of the following series:
   (i) Sine (ii) Cosine (iii) Exponential
5. Create the sales report for M sales persons and N products using two dimensional arrays.
6. Simulate following Banking operations using functions.
   (i) Deposit (ii) Withdrawal (iii) Balance Enquiry
7. Implement using recursion
   (i) Find the solution of Towers of Hanoi problem using recursion.
   (ii) Fibonacci number generation.
   (iii) actorial
8. Generate Student mark sheets using structures.
9. Create a collection of books using arrays of structures and do the following:
   (i) Search a book with title and author name (ii) Sorts the books on title.
10. Perform string operations using pointers.

TOTAL :(P: 60) = 60 PERIODS

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17CAP02 OFFICE AUTOMATION LABORATORY					
		L	T	P	C
		0	0	2	1
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn about Microsoft Word for creating and merging files	1.1	Able to create documents with simple formatting, merge files and working with various fonts.	b,c,f,j,k	
2.0	To understand about tables in word.	2.1	Able to create, edit, and sort contents in table.	b,c,f,j,k	
3.0	To learn about Excel	3.1	Create Excel documents, presentation charts and what-if analysis.	a,b,c,k,l	
4.0	To learn about Power Point	4.1	Develop Presentation with animation, text and images and self-running presentations.	b,c,d,f,k	
5.0	To learn about Access	5.1	Create a database, Storing and retrieving data from a Database	b,c,d,i,k	

LIST OF EXPERIMENTS

MICROSOFT WORD

1. Creating and formatting a simple document (using Bulleted and Numbered list, adding Headers, Footers and Page numbers).
2. Working with Tables (Creating tables, Editing tables, Formatting tables, Converting tables, Sorting table contents, etc.)
3. Mail Merge

MICROSOFT EXCEL

4. Formatting the worksheets (Formatting the cells, rows and columns) & working with Functions and formulae.
5. Presenting Data with charts, performing What – If analysis with Data table & Summarizing the data using Pivot table.

MICROSOFT POWER POINT

6. Presentation of Animation with Text, Images and Media file.
7. Creating PowerPoint Slides with graph, creating self-running Presentations & Hiding and Showing the slides.

MICROSOFT ACCESS

8. Creating a Database with key and field properties setting, entering and editing data using Forms.
9. Retrieving data from more than one related table using Queries.
10. Generate Report using Report Wizards.

TALLY

11. Creation of Accounts Masters, Accounts Voucher with Voucher Entry, conversion, Interest Calculation & Printing of voucher using Tally.
12. Creation of Trading Account, Profit/Loss Account & Balance Sheet using Tally.

TOTAL :(P: 30) = 30 PERIODS

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17CAE01 FUNCTIONAL ENGLISH – I					
		L	T	P	C
		0	0	2	1
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To recognize and understand the meaning of targeted grammatical structures.	1.1	Develop communicative proficiency by articulating words and sentences undoubtedly.	d,e,f,h	
2.0	To train the students to summon words, phrases relevant to the immediate communication tasks.	2.1	Prepare, organize and deliver an engaging oral presentation and articulate their own ideas in relation to other voices and ideas.	e,f,h	
3.0	To prepare students acquire the ability to write effectively in English in real life situations and work related situations.	3.1	Write effectively for a variety of professional and social settings.	d,f,h	

UNIT I – GRAMMAR (10)

Parts of Speech – Tenses – Primary Auxiliaries – Idioms and Phrases – One Word Substitution – Homophones and Homonyms.

UNIT II – SPEAKING (10)

Introducing Oneself – Exchanging Personal information (Likes and Dislikes) – Talking about Family & Friends - Asking about Routine Actions and Expressing Opinions - Participating in Short Conversations - Situational Talk.

UNIT III – WRITING (10)

Seeking Permission for Industrial Visit - Seeking Permission for In-plant Training – Checklist – Instruction – E-Mail Writing .

TOTAL (P: 30) = 30 PERIODS

TEXT / REFERENCE BOOKS:

1. Sudharshana N.P and Saveetha.C., "English for Technical Communication", Cambridge University Press, New Delhi, 2016.
2. Jackman, Vanessa and Russell Whitehead, "Cambridge English Business Preliminary Practice Tests", New Delhi, Oxford University Press, 2016.
3. Rizvi, Ashraf M., "Effective Technical Communication", Tata McGRaw Hill Publishing Company Limited, New Delhi, 2006.
4. Hewings, M., "Advanced English Grammar", Cambridge University Press, Chennai, 2000.

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17CAB04 SOFTWARE ENGINEERING					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Programme Outcomes**	
1.0	To become familiar with the various software development life Cycle Models.	**1.1**	Become competent in recognizing different models, its features and issues.	**a,b,d,h,i**	
2.0	To get an in-depth knowledge about Requirements to develop a project.	**2.1**	Understand about Requirements, Prototyping and Techniques.	**a,b,g,h,i**	
3.0	To learn about Design Concepts.	**3.1**	Understand about importance of Design.	**a,b,c,i,k**	
4.0	To learn about different types of Testing.	**4.1**	Understand about testing and its features.	**b,g,h,k,l**	
5.0	To learn about SPM Concepts.	**5.1**	Well-known about various Estimation Methods.	**b,h,i,k,l**	

UNIT I –INTRODUCTION **(9)**

Introduction - Software Process-Life Cycle Models: Waterfall - Incremental - Spiral - WINWIN Spiral -Evolutionary - Prototyping - Object Oriented - Fourth Generation Techniques - Agile Process Models-Computer Based System-System Engineering Lifecycle Process-System Engineering Hierarchy.

UNIT II - SOFTWARE REQUIREMENTS **(9)**

Functional and Non Functional Requirements - User Requirements - System Requirements - Requirement Engineering Process - Software Prototyping - Prototyping in Software Process - Rapid Prototyping Techniques - User Interface Prototyping.

UNIT III- ANALYSIS AND DESIGN CONCEPTS **(9)**

Analysis and Modeling - Data Modeling - Functional Modeling - Behavioral Modeling - Structural Analysis -Design Concepts - Modular Design - Architectural Style - Transform and Transaction Mapping.

UNIT IV – TESTING **(9)**

Introduction - Test Activities - Black box Testing - White box Testing - Structural Testing - Unit Testing -Integration Testing - System Testing - Strategic Approach and Issues – Debugging - SRS.

UNIT V- SOFTWARE PROJECT MANAGEMENT **(9)**

Measures and Measurement - Software Cost Estimation - Function Point Models - COCOMO Model - Delphi Model - Defining Task Network - Scheduling - Earned Value Analysis - Taxonomy of Case Tools.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. Roger S. Pressman, "Software Engineering: A Practitioner Approach", 8th Edition, McGraw-Hill, 2015.
2. Sommerville, "Software Engineering", 10th Edition, Addison Wesley Longman, Pearson Education, 2015.
3. Pankaj Jalote, "A Concise Introduction to Software Engineering", Springer Verlag, 2008.

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17CAA03 ESSENTIALS OF MANAGEMENT					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To understand management and how an organization functions.	1.1	Understand about management and organization	a,b,e,f,g	
2.0	To understand about planning principles.	2.1	Understand about objectives, types and process.	b,e,f,g,h	
3.0	To understand about how to organizing principles.	3.1	Understand about groups, staffing and Training.	d,e,f,g,h	
4.0	To understand about leadership	4.1	Able to manage, motivate staff and job enrichment.	b,e,f,g,l	
5.0	To learn about controlling	5.1	Able to understand types of control, Budgetary and non-budgetary control techniques	b,e,f,g,l	

UNIT I -INTRODUCTION TO MANAGEMENT (9)

Organization-Management-Role of managers - Evolution of management thought-Organization and the environmental factors-Managing globally -Strategies for International business.

UNIT II –PLANNING (9)

Introduction-Nature of planning-Purpose of Planning-Types of Planning-Objectives-Setting objectives-Process of Managing by Objectives-Strategies-Policies and Decision Making.

UNIT III-ORGANIZING (9)

Nature and purpose of organizing -Organization structure -Formal and informal groups / organization - Line and staff authority -Departmentation -Span of control -Centralization and decentralization -Delegation of authority -Staffing - Selection and Recruitment -Orientation -Career development - Career stages -Training -Performance appraisal.

UNIT IV –DIRECTING (9)

Directing Scope-Human Factors in Managing-Creativity and Innovation-Harmonizing objectives- Leadership-Motivation-Motivation Techniques-Job Enrichment-Communication.

UNIT V-CONTROLLING (9)

Process of controlling - Types of control - Budgetary and non-budgetary control techniques -Managing productivity - Cost control -Purchase control -Maintenance control -Quality control -Planning operations.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. Andrew J. Dubrin, "Essentials of Management", Thomson Southwestern, Ninth Edition, 2012.
2. Samuel C. Certo and TervisCerto, "Modern Management: Concepts and Skills", Pearson Education, Twelfth Edition, 2012.
3. Harold Koontz and Heinz Weihrich, "Essentials of management: An International & Leadership Perspective", Ninth Edition Tata McGraw-Hill Education, 2012.
4. Stephen P.Robbins, David A.DeCenzo and Mary Coulter, Fundamentals of Management, Prentice Hall of India, 2012.

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17CAB05 COMPUTER ARCHITECTURE AND ORGANIZATION					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB02					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To impart the knowledge about Number systems	1.1	Understand the number base system and conversion.	a,b,c,f,l
2.0	To impart knowledge about the various machine instruction of a computer.	2.1	Able to trace the execution sequence of an instruction through the processor..	a,b,c,j,k
3.0	To learn about CPU organization.	3.1	Acquire knowledge about processor, Instruction sets and ALU.	b,c,f,j,k
4.0	To learn about processor design.	4.1	Acquire knowledge about bus organization and processor design	b,c,f,j,k
5.0	To understand the importance of the memory and I/O system	5.1	Understand about memory system and I/O device management.	a,b,c,f,i

UNIT I – NUMBER SYSTEMS AND COMPUTER STRUCTURES **(9)**

Digital Systems – Binary Numbers – Number Base Conversions – Octal and Hexadecimal Numbers – Complements – Signed Binary Numbers – Binary Codes – Binary Storage and Registers – Binary Logic - Functional units – Basic operational concepts. – Bus structures – Performance.

UNIT II - MACHINE INSTRUCTIONS AND PROGRAMS **(9)**

Memory Location and Addresses – Memory Operations – Instruction and Instruction Sequencing – Addressing Modes – Assembly Language – Basic Input / Output Operations – Stacks and Queues.

UNIT III- CPU ORGANIZATION AND DESIGN **(9)**

Processor basics : CPU Organization – Data Representation – Instruction Sets - Data path design: Fixed point Arithmetic – Arithmetic-Logic units

UNIT IV - PROCESSOR DESIGN **(9)**

Basic concepts – Execution of a complete Instruction – Multiple Bus Organization - Hardwired control – Micro programmed control – Pipelining: Concepts – Data Hazards – Instruction Hazards – Influence on Instruction sets - Super scalar operation.

UNIT V- MEMORY AND I/O SYSTEM **(9)**

Basic concepts – Semiconductor RAM memories – Read only Memories – Cache memories – Performance considerations – Virtual Memories – Secondary storage. I/O Organization: Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. M.Morris Mano and Michael D. Ciletti , "Digital Design", Prentice Hall Inc., Fourth Edition, 2007. (Unit I)
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Tata McGraw Hill, Fifth Edition, 2002. (Unit II,IV, V)
3. John P.Hayes, "Computer Architecture and Organization", Third Edition, McGraw Hill,1998. (Unit III)

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17CAB06 DATA STRUCTURES					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB01					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To provide a clear knowledge about the different types of data structures	1.1	Understand the behavior of basic data structure.	a,b,c,j,l
2.0	To learn about data structure such as stack and Queue	2.1	Able to implement stack and Queue Applications	a,b,c,j,l
3.0	To understand different types of Trees	3.1	Able to implement the tree and search the element in the trees.	a,b,c,i,j
4.0	To learn various types of sorting and searching	4.1	Understand different types of algorithms specifically available for sorting and searching, and how they can be applied on different types of data structures.	a,b,c,i,l
5.0	To learn about graph concepts	5.1	Ability to find the shortest path between the nodes.	a,b,c,j,l

UNIT I – INTRODUCTION TO DATA STRUCTURES **(9)**

Introduction – Data and Information – Types of Data Structures – Primitive and Non-primitive Data Structures and operations – Abstract Data Types - List ADTs - Implementation of List – Traversal of List – Searching and Retrieving an Element – Predecessor & Successor – Insertion – Deletion- Sorting- Merging List - Linked Lists – Operations on Linked Lists- Doubly Linked Lists – Circular Linked Lists – Applications of Linked Lists.

UNIT II - STACK AND QUEUE **(9)**

Stack ADT – Stack Implementation – Operation on Stack – Applications of Stack: Representation of Arithmetic Expression – Infix, Prefix and Postfix Notations – Evaluation of postfix Expression – Conversion of Expression from Infix to Prefix and Postfix. Queue ADT – Queue Implementation – Operations on Queue – Types of Queue - Applications of Queues.

UNIT III – TREES **(9)**

Basic Terminologies of Tree - Binary Trees- Complete binary Tree – Strictly binary Tree – Expression Tree – Binary Tree Representations - Operation on binary trees – Traversal of a Binary Tree – Search Tree ADT : Binary Search Tree - AVL Tree - B Tree.

UNIT IV - SORTING AND SEARCHING **(9)**

Sorting: Insertion Sort – Selection sort – Bubble sort – Quick sort - Merge Sort - Radix Sort – Heap Sort. Searching: Linear search – Binary search – Hashing: Hash Function – Hash Collision Techniques: Separate Chaining - Open Addressing: Linear Probing – Quadratic Probing – Double hashing. Hashing Methods: Division – Mid-Square – Folding Method.

UNIT V- GRAPHS **(9)**

Graphs – Terminologies of Graph - Graph Representation – Topological Sort - Shortest path algorithms: Unweighted Shortest paths - Dijkstra's algorithm – All pairs shortest path. Minimum Spanning Tree: Prim's Algorithm – Kruskal's Algorithm – Application of Depth First Search: Undirected Graphs – Biconnectivity – Euler Circuits – Directed Graphs – Finding Strong Components.

TOTAL :(L: 45) = 45 PERIODS

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison Wesley, Second Edition, 2007.
2. Ashok N. Kamthane , " Introduction to Data Structures in C", Pearson Education, Second Edition, 2009.
3. Tanaenbaum A.S.,Langram Y. Augestein M.J, "Data Structures using C", Pearson Education, First Edition, 2004.

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17CAB07 OPERATING SYSTEMS					
		L	T	P	C
		3	0	2	4
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To become familiar with the fundamental concepts of operating systems.	1.1	Become competent in recognizing operating systems features and issues.	b,c,d
2.0	To get an in-depth knowledge about process management	2.1	Understand about Process, semaphores and deadlocks.	b,c,d,l,k
3.0	To learn about memory management.	3.1	Understand about Paging and segmentation	b,c,d,l,k
4.0	To understand about disk scheduling	4.1	Understand about file system and I/O device management.	b,c,d,l,k
5.0	Design and implementation of OS	5.1	Well-known about design and implementation.	b,c,d,l,k

UNIT I –INTRODUCTION (9)

Introduction – Operating Systems and services – Processes – CPU Scheduling approaches.

UNIT II - PROCESS SYNCHRONIZATION (9)

Process synchronization – Semaphores – Deadlocks – Handling deadlocks – Multithreading.

UNIT III-MEMORY MANAGEMENT (9)

Memory management – Paging – Segmentation – Virtual Memory – Demand paging – Replacement Algorithms.

UNIT IV -DISK SCHEDULING (9)

Disk Scheduling approaches – File systems – Design issues – User interfaces to file systems – I/O device management.

UNIT V-CASE STUDIES (9)

Case study –Design and implementation of the UNIX OS, Process model and structure – Memory management - File system – UNIX I/O management and device drivers – Windows – System components – Process Management.

REFERENCES:

1. Abraham Silberschatz Peter B. Galvin, G. Gagne, "Operating System Concepts", Eighth Edition, Addison Wesley Publishing Co., 2010.
2. M. J. Bach, "Design of the Unix Operating System", Fifth Edition, Pearson Education, 1990.
3. Willam Stalling, "Operating System", Fifth Edition, Pearson Education, 2005.

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LIST OF EXPERIMENTS

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority.
4. IPC using Pipe Processing
5. Implement Semaphores.
6. Implement Bankers algorithm for Dead Lock Avoidance
7. Implement an Algorithm for Dead Lock Detection
8. Implement file allocation strategies.
9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU
10. Implement File Organization Techniques.

TOTAL (L: 45+T:30) = 75 PERIODS

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17CAP03 SOFTWARE ENGINEERING LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn how to design the Applications	1.1	Able to design the Front End using GUI.	b,c,i,j,k	
2.0	To learn how to create the Database.	2.1	Able to perform different commands in Back End.	a,c,i,k,l	
3.0	To learn about various connectivity to connect Front and Back End.	3.1	Able to implement connectivity like ADODC, ADO.	a,b,c,i,k	
4.0	To learn about how to develop projects.	4.1	Able to implement code for application projects.	b,c,i,k,l	
5.0	To learn how to test application.	5.1	Able to check and finalize the applications.	b,c,i,k,l	

LIST OF EXPERIMENTS

1. Railway Reservation System
2. Payroll Processing Application
3. Inventory System
4. Banking Operations
5. Library Management System
6. Dictionary
7. Telephone Directory
8. Text Editor

TOTAL :(P: 60) = 60 PERIODS

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17CAP04 DATA STRUCTURES LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: 17CAP01					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To develop skills to design and analyze simple linear and non linear data structures.	1.1	Be able to design and analyze the time and space efficiency of the data structure.	a,b,c,j,l
2.0	To Strengthen the ability to identify and apply the suitable data structure for the given real world problem	2.1	Be capable to identity the appropriate data structure for given problem.	a,b,c,j,l
3.0	To Gain knowledge in practical applications of trees	3.1	Able to implement algorithm for binary traversal and binary searching	a,b,c,j,l
4.0	To Gain knowledge in practical applications of sorting and searching	4.1	Able to implement algorithm for sorting and searching	a,b,c,j,l
5.0	To learn the various concepts of Graphs.	5.1	Able to design the algorithm for shortest path distance and minimum spanning tree	a,b,c,j,l

LIST OF EXPERIMENTS

1. Linked List : Singly, Doubly and Circular
2. Stack
3. Queue
4. Evaluation of Expression
5. Binary Tree Traversal
6. Binary search Tree operation : AVL, B Tree
7. Sorting
8. Searching
9. Dijikstra's Algorithm
10. Minimum Spanning Tree

TOTAL :(P: 60) = 60 PERIODS

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17CAE02 FUNCTIONAL ENGLISH – II					
		L	T	P	C
		0	0	2	1
PREREQUISITE: 17CAE01					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To improve the students lexical, grammatical and communicative competence.	1.1	Understand & appreciate vocabulary and syntax with accuracy and clarity.	d,e,f,h	
2.0	To enhance the students communicative skills in real life situations.	2.1	Disseminate professional information through appropriate means of communication.	e,f,h	
3.0	To equip the students with appropriate written communication skills.	3.1	Explain effectively and persuasively and produce different types of writing.	d,f,h	

UNIT I GRAMMAR (10)

Vocabulary – Modifiers – Degrees of Comparison – Connectives – Prepositional Phrases - Reported Speech.

UNIT II SPEAKING (10)

Object Description – Talking about Places – Role Play – Asking for and Giving Directions – Presentation Skills.

UNIT III WRITING (10)

Inviting Dignitaries – Accepting Invitation – Declining Invitation – Recommendations – Report Writing – Paragraph Writing .

TOTAL (P: 30) = 30 PERIODS

TEXT / REFERENCE BOOKS:

1. Kumar, Suresh E., "Engineering English", Orient Blackswan, Hyderabad, 2015.
2. Raman, Meenakshi and Sangeetha Sharma, "Technical Communication Principles and Practice", Oxford University Press, New Delhi, 2014.
3. Board of Editors, "Fluency in English – A Course Book for Engineering and Technology", Orient Blackswan, Hyderabad, 2016.
4. Comfort, Jeremy, et al., "Speaking Effectively: Developing Speaking Skills for Business English", Cambridge University Press, Cambridge, Reprint, 2011.

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17CAA04 RESOURCE MANAGEMENT TECHNIQUES AND STATISTICS				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To understand, develop and solve mathematical model of linear programming problems.	1.1	Students will be able to construct and solve linear programming models to answer business optimization problems.	a,b,d,k,l
2.0	To understand, develop and solve mathematical model of Transport and assignment problems.	2.1	Students will be able to apply transportation and assignment models to find optimal solution in warehousing and Travelling.	a,e,l
3.0	To provide knowledge about Game Theory in Computer Applications.	3.1	Students will be able to appraise theoretical predictions obtained from Game Theory analyses against real world conflicts	a,c,d,l
4.0	To understand network modeling for planning and scheduling the project activities.	4.1	Students will be able to prepare project scheduling using PERT and CPM.	a,b,e,l
5.0	To provide knowledge in Statistical Quality Control.	5.1	Students will be able to construct Charts for variables and attributes.	a,b,d,l

UNIT I - LINEAR PROGRAMMING MODELS	**(9)**
Mathematical Formulation-Graphical Solution of linear programming models-Simplex method-Big-M Method-Variants of Simplex method.	
UNIT II - TRANSPORTATION AND ASSIGNMENT MODELS	**(9)**
Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution: North West Corner Rule, Least Cost Method, VAM- Optimum solution – degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – variants of the Assignment problem.	
UNIT III - GAME THEORY	**(9)**
Definition-Pay-off-Two person zero -sum games -The maximin-minimax principle-Games without saddle points (Mixed strategies)-2x2 games without saddle points-Graphical method for 2xn or mx2 games-Dominance property.	
UNIT IV - SCHEDULING BY PERT AND CPM	**(9)**
Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling.	
UNIT V - STATISTICAL QUALITY CONTROL, CORRELATION AND REGRESSION	**(9)**
Simple Correlation – Regression Lines. SQC: Introduction to Quality Control – Control Charts of Variables (Mean and Range Charts), Control Charts of Attributes (p-Chart, np-Chart, c-Chart).	
TOTAL (L: 45) = 45 PERIODS	

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REFERENCES:

1. Taha, H.A.,"Operations Research: An Introduction", Seventh Edition, Pearson Education, 2004.
2. S. C. Gupta, V. K. Kapoor, "Fundamentals of mathematical Statistics", Eight Edition, Sultan Chand and Sons, New Delhi, 2001.
3. A .M. Natarajan, P. Balasubramani, A.Tamilarasi, "Operations Research" , Pearson Education, Asia, 2005.
4. Prem Kumar Gupta , D.S. Hira "Operations Research", S. Chand & Company Ltd., New Delhi, Third Edition, 2003.
5. V.Sundaresan,K.S.Ganapathy Subramanian, K.Ganesan, "Resource Management Techniques", A.R.Publication, 2002.

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17CAB08 DATABASE MANAGEMENT SYSTEMS					
		L	T	P	C
		3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To learn the different issues involved in the design and implementation of a database system.	1.1	Students will be able to understand database architecture, data models and utilize a wide range of features available in a DBMS package.	b,d,g,h,i
2.0	Understand database structure, relational algebra, integrity constraints	2.1	Students will be able to use SQL- the standard language of relational databases.	b,c,d,j,k
3.0	Formulate SQL queries and PL/SQL on data and its syntax.	3.1	Students will be able to use PL/SQL - procedural language extension to Structured Query Language.	b,c,d,j,k
4.0	Apply normalization techniques to normalize the database.	4.1	Students will be able to understand the functional dependencies and their relationship to keys	j,k,l
5.0	Understand the techniques for controlling the consequences of concurrent data access.	5.1	Students will be able to understand the concept of Transaction processing.	g,j,k,l

UNIT I - INTRODUCTION TO DATABASE SYSTEMS	(9)
Introduction to database systems - Definition of DBMS - Advantages of DBMS - Views of data - Levels of data abstraction - Data Models and types - Database architecture - Entity relationship model - ER diagram -EER MODEL- Introduction about NoSQL.	
UNIT II - RELATIONAL DATA MODEL	**(9)**
Relational database structure - Procedural and Non procedural languages - Relational algebra : operations - Integrity Constraints - SQL Commands : DDL - DML – TCL – Set operations – Join Operations- Aggregation in SQL- Using the group by clause.	
UNIT III - SQL AND PL/SQL	**(10)**
PL/SQL Block - Introduction to PL/SQL - The Advantages of PL/SQL - PL/SQL Architecture - PL/SQL Data types - Variable and Constants - Using Built_in Functions - Conditional and Unconditional Statements -Stored procedures - PROCEDURE with Parameters (IN,OUT and IN OUT) - POSITIONAL Notation and NAMED Notation - Procedure with Cursors - Dropping a Procedure - Functions in PL/SQL : Difference between Procedures and Functions - User Defined Functions - Nested Functions - Using stored function in SQL statements- Trigger - Types of Triggers - Row Level Triggers - Statement Level Triggers - DDL Triggers.	
UNIT IV - DEPENDENCY PRESERVATION AND DB DESIGN	**(8)**
Functional dependency: Full functional Dependency - Partial dependency - Transitive dependency - multi valued dependency - Decomposition - Normalization - Normal Forms : 1NF - 2NF - 3NF - BCNF - 4NF - 5NF.	
UNIT V - TRANSACTIONAL PROCESSING	**(9)**
Transaction - Properties of transaction - Transaction state - Serialization : types - Need for Serialization - Two Phase Commit - Save Point - Concurrency - Advantages of concurrency - Concurrency control mechanism - Locking protocols - Timestamp protocol.	
	TOTAL (L=45) = 45 PERIODS

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REFERENCES:

1. Elmasri.R, S.V. Navathe. "Fundamentals of Database Systems", Sixth Edition, Pearson, New Delhi, 2013.
2. Kevin Loney, Bob Bryla, "Oracle Database DBA Handbook", Tata McGraw Hill Edition, Tata McGraw Hill Publication, 2005.
3. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2010.
4. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, New Delhi, 2003.
5. C. J. Date, "An Introduction to Database Systems", 8th Edition, Addison Wesley, 2004.

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17CAB09 COMPUTER NETWORKS				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To learn networking concepts, network architectures and basic communication model.	1.1	Student will be able to identify the data flow in network using protocols, functionality of layers and transmission media.	b,c,e,g,i
2.0	To understand function and design strategy of data link layer.	2.1	Student will be able to acquire knowledge about methods of error detection and correction, data link layer protocols and services, and various versions of IEEE Project 802.	a,b,c,d,j
3.0	To understand function and design strategy of network layer.	3.1	Student will be able to acquire knowledge about various switching networks, addressing methods and finding shortest routing algorithms.	a,b,c,j,k
4.0	To understand function and design strategy of transport layer.	4.1	Student will be able to acquire knowledge about various functionalities of protocols such as TCP, UDP and its usage.	a,b,c,j,k
5.0	To understand function and design strategy of application layer.	5.1	Student will be able to acquire knowledge about WWW, DNS and various functionalities of protocols such as HTTP, FTP, SMTP and its usage.	b,c,j,k,l

UNIT I - NETWORK INTRODUCTION & PHYSICAL LAYER	**(9)**
Components – Data Flow – Networks – Categories of Network - Internet and its standards – Network Topology - Protocol – Protocol Layering - OSI Reference Model - TCP/IP Reference Model – Physical Layer: Transmission Media – Line Coding and its Schemes - Transmission Modes.	
UNIT II - DATA LINK LAYER	**(9)**
Introduction of DLL – Link-Layer Addressing - Error Detection and Correction: Types of Errors, Block Coding - Cyclic Codes – Checksum - Forward Error Correction: Hamming Distance – Data Link Control: DLC Services – Data-Link Layer Protocols - HDLC. Wired LANs: Standard Ethernet - Fast Ethernet - Gigabit Ethernet - Wireless LAN: IEEE 802.11 Project – Bluetooth.	
UNIT III - NETWORK LAYER	**(9)**
Switching – Circuit Switched Networks - Packet Switching – Structure of a Switch – Network Layer Services and Performance – IPV4 Addresses – Routing Algorithms: Distance Vector Routing – Link State Routing – BGP4.	
UNIT IV - TRANSPORT LAYER	**(9)**
Transport Layer Services – Connection Establishment – Flow control – Transmission Control Protocol (TCP) – Congestion Control and Avoidance – User Datagram Protocol (UDP). - Transport for Real Time Applications (RTP).	
UNIT V - APPLICATION LAYER	**(9)**
World Wide Web and HTTP – FTP – Electronic Mail – TELNET – Secure Shell (SSH) - Domain Name Space (DNS).	
TOTAL (L: 45) = 45 PERIODS	

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1. Behrouz A. Forouzan, "Data communication and Networking", Fifth Edition, Tata McGraw-Hill, 2013.
2. Andrew S. Tanenbaum, David J. Wetherall "Computer Networks", PHI, Fifth Edition, 2010.
3. William Stallings, "Data and Computer Communication", Tenth Edition, Pearson Education, 2013.
4. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson, 2012.

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17CAB10 ANALYSIS OF ALGORITHM AND DESIGN				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	Analyze the asymptotic performance of algorithms.	1.1	Students will be able to analyze worst-case running times of algorithms using asymptotic analysis	a,b,c
2.0	To understand the concepts of Heaps and Search structures.	2.1	Students will be able to use and implement major heap and search data structures.	a,b,c,j
3.0	Ability to understand and design algorithms using divide and conquer approach and greedy strategy.	3.1	Students will be able to know how to design algorithms using the divide-and-conquer and greedy strategy.	a,b,c,j
4.0	Ability to understand and design algorithms using dynamic programming.	4.1	Students will be able to know how to design algorithms using the dynamic programming strategy.	a,c,j,k.l
5.0	Ability to understand and design algorithms using backtracking and branch and bound algorithm	5.1	Students will be able to know how to design algorithms using the backtracking and branch and bound strategy.	a,c,j,k,l

UNIT I – FUNDAMENTALS	**(8)**
Introduction to Linear and Non Linear data structures – Notion of Algorithm – Characteristics of Algorithm – Fundamentals of Algorithm Analysis - Asymptotic Notations – Recurrence Equations – Solving Recurrence Equations.	
UNIT II - HEAP AND SEARCH STRUCTURES	**(10)**
Priority Queues – Applications of Priority Queues – Binary Heap – Leftist Heaps –Binomial Heap. Binary Search Tree - AVL Trees - Multi-way Search Tree: m-way Search Tree - B-Trees – B+ Trees.	
UNIT III - DIVIDE AND CONQUER METHOD AND GREEDY METHOD	**(9)**
Divide and conquer methodology – Merge sort – Quick sort – Binary search – Binary tree traversal – Multiplication of large integers – Strassen's matrix multiplication – Greedy method – Prim's algorithm – Kruskal's algorithm –Dijkstra's algorithm.	
UNIT IV - DYNAMIC PROGRAMMING	**(9)**
Computing a binomial coefficient – Warshall's and Floyd's algorithm – Optimal binary search tree – Knapsack problem-Memory functions.	
UNIT V - BACKTRACKING AND BRANCH AND BOUND	**(9)**
Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Travelling salesman problem.	
	TOTAL (L: 45) = 45 PERIODS

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REFERENCES:

1. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structures in C++", Second Edition, University Press, 2010.
2. Ellis Horowitz, Sartaj Sahni , Sanguthevar Rajasekaran, "Computer Algorithms/C++", University Press, 2010.
3. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Education, Second Edition, 2005.
4. Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman, "Data Structures and Algorithms", First Edition, Addison Wesley Publications., 2010.
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17CAP05 DATABASE MANAGEMENT SYSTEMS LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	Learn to create and use a database	1.1	Students will be able to design and implement a database schema for a given problem domain.	a,b,c	
2.0	Be familiarized with a query language	2.1	Students will be able to query and populate using database.	a,b,c,e,i	
3.0	Have a good understanding of DDL, DML Commands and DCL commands.	3.1	Students will be able to create and maintain tables using PL/SQL.	b,c,e,i,k	
4.0	Familiarize advanced SQL queries and PL/SQL	4.1	Students will be able to create triggers and functions	b,c,e,i,k	
5.0	Be exposed to different applications	5.1	The students will be able to develop the simple project and prepare reports.	c,e,i,k,l	

LIST OF EXPERIMENTS

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
7. Write a PL/SQL block that handles all types of exceptions.
9. Creation of database triggers and functions
10. Mini project (Application Development using Oracle/ Mysql)
    a) Inventory Control System.
    b) Material Requirement Processing.
    c) Hospital Management System.
    d) Railway Reservation System.
    e) Personal Information System.
    f) Web Based User Identification System.
    g) Timetable Management System.
    h) Hotel Management System

TOTAL :(P: 60) = 60 PERIODS

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17CAP06 ANALYSIS OF ALGORITHM AND DESIGN LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn programming constructs.	1.1	Students will be able to apply generic programming technique to implement any data structure.	a,b,c,k	
2.0	To implement the linear and non-linear data structure.	2.1	Students will be able to apply appropriate search trees for an application.	a,b,c,j,k	
3.0	To Understand the greedy and dynamic strategy.	3.1	Students will be able to apply the dynamic programming.	a,b,c,d,j	
4.0	To Implement divide and conquer algorithms	4.1	Students will be able to apply various sorting and searching algorithm.	a,c,l,j,l	
5.0	To Implement backtracking and branch and bound algorithm	5.1	Students will be able to apply appropriate algorithms for an application.	a,c,d,i,l	

LIST OF EXPERIMENTS

1. Implementation of basic data structures
2. Implementation of Binary Heap
3. Implementation of Binomial Heap
4. Implementation of AVL Trees
5. Implementation of B-Tree
6. Implementation of Merge/Quick sort
7. Implementation of Prim's algorithm / Kruskal's algorithm
8. Implementation of Dijkstra's algorithm
9. Implementation of N Queens Problem
10. Implementation of Sum of Subset Problem
11. Implementation of Knapsack Problem

TOTAL :(P: 60) = 60 PERIODS

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17CAE03 CAREER DEVELOPMENT SKILLS – I			
L	T	P	C
0	0	2	1

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To use appropriate grammar learned to describe ideas	1.1	Students will be able to use appropriate grammar learned to describe ideas.	f,g,h,i
2.0	To use verbal communication appropriately at the right time.	2.1	Students will be able to use verbal communication appropriately at the right time.	f,g,h,i
3.0	To interpret information from variety of mass media.	3.1	Students will be able to interpret information from variety of mass media.	f,g,h,i

UNIT I	**(10)**
Tenses – Verb (Auxiliary and Modal) – Yes/No Type Questions – Reported Speech – Gerund – Phrasal Verbs.	
UNIT II	**(10)**
Self-Introduction – Presentation Skills - Visual Communication.	
UNIT III	**(10)**
Time Management – Group Discussion - Public Speaking.	
	TOTAL (L: 30) = 30 PERIODS

REFERENCES:

1. Murphy, Raymond, "Essential Grammar in Use", Cambridge University Press, UK, 2007.
2. 2. Rizvi, Ashraf M., "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 2006

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17CAB11 DATA MINING AND DATA WAREHOUSING

L	T	P	C
3	0	0	3

PREREQUISITE: 17CAB08

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To impart knowledge in Data Mining.	1.1	Students will be able to understand various types of data that can be mined.	a,b,c
2.0	To understand the various Data Preprocessing in Data Mining.	2.1	Students will be able to gain awareness about the importance of data cleaning.	d,e,f
3.0	To provide knowledge in classification methods and clustering.	3.1	Students will be able to know about various classification methods and the Evaluation of clustering.	d,f,g
4.0	To understand about various pattern mining.	4.1	Students will be able to apply a various patterns in data mining.	h.i,j
5.0	To provide knowledge Data Warehousing.	5.1	Students will be able to acquire knowledge about various data warehousing design and its usage.	j,k,l

UNIT I - INTRODUCTION TO DATA MINING (9)

Data Mining Definition - Why Data Mining - Types of Data can be Mined – Patterns – Technologies - Applications-Issues in Data Mining - Data Objects and Attribute Types - Basic Statistical Descriptions of Data - Data Visualization - Measuring Data Similarity and Dissimilarity - Case Study.

UNIT II - DATA PREPROCESSING (9)

Data Preprocessing: An Overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization.

UNIT III - CLASSIFICATION AND CLUSTERING (9)

Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule Based Classification– Model Evaluation and Selection. Clustering: Analysis – Partitioning, Hierarchical, Density Based Methods and Grid Based Methods – Evaluation of Clustering.

UNIT IV - PATTERN MINING (9)

Pattern Mining in Multilevel, Multidimensional Space-Constraint: Based Frequent Pattern Mining-Mining High Dimensional Data and Colossal Patterns-Mining Compressed Patterns-Pattern Exploration and Application.

UNIT V - DATA WAREHOUSING (9)

Data Warehouse: Basic Concepts - Data Warehouse Modeling Data Cube and OLAP - Data Warehouse Design and Usage – Implementation - Data Generalization- Case Study.

TOTAL (L: 45) = 45 PERIODS

REFERENCES:

1. Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers, 2012.
2. George M. Marakas, "Modern Data Warehousing, Mining and Visualization: Core Concepts", Spring, 2012.

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17CAB13 WEB PROGRAMMING

L	T	P	C
3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To learn the Client and Server side Scripting basics.	1.1	Students will be able to understand how to validate the web page.	b,c,h
2.0	To provide knowledge about Style Sheets.	2.1	Students will be able to create a dynamic page.	a,b,c,h
3.0	To learn the architecture of Servlets	3.1	Students will be able to develop a server side program.	b,c,d,h,i
4.0	To provide knowledge of JSP and Java Beans	4.1	Students will be able to create a Website.	b,c,d,h,i
5.0	To give knowledge about XML and Web Services.	5.1	Students will be able to understand concepts of XML and Web Services.	b,h,i,k,l

UNIT I – SCRIPTING (9)

Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script- Object, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML5- HTML 5 canvas - Web site creation using tools.

UNIT II - CSS3 (9)

CSS building blocks- Working with Style sheets- Defining selectors- Formatting text with styles- Layout with styles- Lists- Forms- Video, Audio and Other Multimedia.

UNIT III – SERVLETS (9)

Java Servlets: Architecture–Overview – Servlet Generating Dynamic Content – Life Cycle -Parameter Data – Sessions - Cookies.

UNIT IV – JSP (9)

JSP: Overview – Basic JSP: Architecture- Lifecycle– Directives – Actions- Implicit Objects– JavaBeans Classes and JSP – MVC Paradigm.

UNIT V - XML AND WEB SERVICES (9)

XML – Introduction-Form Navigation-XML Documents- XSL – XSLT- JSON - Web services – UDDI – WSDL - Java Web Services – Web Resources - Web Servers.

TOTAL (L: 45) = 45 PERIODS

REFERENCES:

1. Elizabeth Castro, Bruce Hyslop, "HTML5 and CSS3", Pearson Edition, 2012.
2. Jeffrey C.Jackson,"WebTechnologies--A Computer Science Perspective", Pearson Education, 2006.
3. Deitel & Deitel Nieto, "Internet &World Wide Web HowTo Program", 5th Edition, 2012.
4. ThomasA. Powell, "The Complete Reference HTML &CSS",5th Edition, 2010.
5. https://www.tutorialspoint.com/jsp

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17CAP07 WEB PROGRAMMING LABORATORY				
L	T	P	C
0	0	4	2

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To get familiar with basics of the Internet Programming.	1.1	Students will be able to implement interactive web page(s) using HTML, CSS and JavaScript.	c,h,j,k,l
2.0	To acquire knowledge and skills for creation of web site considering both client and server side programming	2.1	Students will be able to design a responsive web site using HTML5 and CSS3	a,c,j,k,l
3.0	To explore different web extensions and web services standards	3.1	Students will be able to build Dynamic web site using server side Programming and Database connectivity.	b,c,d,j,l
4.0	To provide knowledge of JSP and Java Beans	4.1	Students will be able to create a Website.	a,c,d,j,l
5.0	To be well versed with XML and web services Technologies	5.1	Students will be able to build well-formed XML Document and implement Web Service using Java.	a,c,d,j,l

LIST OF EXPERIMENTS

1. Write a html program for creation of web site with header, nav, section, aside, articles, figure, footer, forms, frames, links, tables, div, etc. tags and CSS.
2. Write a program to drag and drop the div elements into HTML5 canvas.
3. Design a web site using HTML and DHTML. Use Basic text Formatting, Images.
4. Create a script that collects numbers from a page and then adds them up and prints them to a blank field on the page.
5. Create a script that prompts the user for a number and then counts from 1 to that number displaying only the odd numbers.
6. Create a script that will check the field in Assignment 1 for data and alert the user if it is blank. This script should run from a button.
7. Create a registration page using JSP.
8. Create a student report card using XML and XSLT
9. Creating simple application to access data base using JDBC Formatting HTML with CSS.
10. Install Tomcat and create simple application Servlet.
11. Write a program to implement web service for calculator application.
12. Write a program to store and retrieve student marks using Web Services (GET and POST methods).

TOTAL :(P: 60) = 60 PERIODS

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17CAE04 CAREER DEVELOPMENT SKILLS – II				
L	T	P	C
0	0	2	1

PREREQUISITE: 17CAE03

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To understand the usage of English grammar and its structure.	1.1	Students will be able to improve written communication skills in English.	f,g,h,i
2.0	To develop the students to workout solution for problems that involves mathematical aptitude.	2.1	Students will be able to solve aptitude problems with ease.	f,g,h,i
3.0	To develop the students to workout solutions for problems that involves general reasoning.	3.1	Students will be able to solve reasoning problems with ease.	f,g,h,i

UNIT I – VERBAL	**(10)**
Articles – Adjectives – Conjunctions – Prepositions – Phrasal verbs.	
UNIT II – APTITUDE	**(10)**
Average – Percentage – Age - Ratio & Proportion – Partnership - Profit &loss – Mixture.	
UNIT III – REASONING	**(10)**
Odd man out - Number series -Syllogism- Coding & decoding - Seating arrangement.	
	TOTAL (L: 30) = 30 PERIODS

REFERENCES:

1. Prasad, Hari Mohan & Sinha, Uma Rani, "Objective English for Competitive Examination", McGraw Hill Education, 2014.
2. Khattar, Dinesh, "The Pearson Guide to Quantitative Aptitude for Competitive Examinations", Pearson Education, 2013.
3. R. S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S. Chand and Co.

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PROFESSIONAL ELECTIVES (PE) –EMBEDDED COURSE (E1& E2)

17CAX01 OBJECT ORIENTED PROGRAMMING IN JAVA – I					
		L	T	P	C
		2	0	2	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Programme Outcomes**	
1.0	To learn about basic concepts of java	1.1	Students will be able to understand about basics of java.	**b,c,h**	
2.0	To learn about constructor and classes	2.1	Students will be able to understand about constructor and classes.	**a,b,c,h**	
3.0	To provide knowledge of files and strings in java	3.1	Students will be able to send and receive data using files.	**b,c,d,h,i**	
4.0	To provide knowledge of Inheritance and packages	4.1	Students will be able to understand about reusability concepts.	**b,c,d,h,i**	
5.0	To learn about Exception in java	5.1	Students will be able to understand about how to run the java program without interruption.	**b,h,i,k,l**	

UNIT I - FUNDAMENTALS OF JAVA PROGRAMMING	**(6)**
Introduction – Features – Applications – Data types – Key words – Scope – Type casting – Arrays – Operators – Control Statements – Command Line Arguments- Lambda Expressions.	
UNIT II - CLASSES and OBJECTS	**(6)**
Class – Object – Methods – Constructors – Overloading methods and Constructors –using Objects as parameters, returning objects - finalize() – Access Control – keywords: this, static and final – Nested and Inner class.	
UNIT III - I/O STREAMS, STRING AND STRINGBUFFER	**(6)**
I/O Basics: Byte Stream & Character Stream – Reading and Writing Files – String and String Buffer class.	
UNIT IV - ABSTRACTION AND REUSABILITY	**(6)**
Inheritance – super – Method overriding – Dynamic Method Dispatch – Abstract class - final with Inheritance – Interface - Package – Wrapper class.	
UNIT V - EXCEPTION HANDLING	**(6)**
Exception Handling – Thread class – Runnable Interface – Inter Thread Communication – Synchronization.	

REFERENCES:

1. Herbert Schildt, "The Complete Reference (Fully updated for jdk7)", Oracle Press, Ninth Edition, 2014.
2. Cay S. Horstmann, "Core Java Volume –I Fundamentals", Prentice Hall , 10th Edition, 2015.
3. Deitel & Deitel, "Java How to Program", Prentice Hall, 10th Edition, 2016.
4. Herbert Schildt ,"Java: A Beginner's Guide", Oracle Press, Sixth Edition, 2014.

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LIST OF EXPERIMENTS

1. Program to implement Operators, Flow Controls
2. Program to implement Classes, Constructors, Overloading and Access Control
3. Program using Nested & Inner Classes, Static and Final
4. Program using File Streams and IO Streams
5. Program to implement Strings, String Buffer
6. Program using Interfaces, Abstract Classes
7. Program to implements Exceptions Concepts
8. Program using Threads

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX02 PYTHON PROGRAMMING					
		L	T	P	C
		2	0	2	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To understand why Python is a useful scripting language for developers.	1.1	Student will be able to read, write, execute by hand simple Python programs.	b,c,k,l	
2.0	To develop Python programs with conditionals and loops.	2.1	Student will be able to structure simple Python programs for solving problems.	a,b,c,j,l	
3.0	To use Python data structures — lists, tuples and strings.	3.1	Student will be able to represent compound data using Python lists, tuples, and dictionaries.	a,b,c,j,l	
4.0	To learn how to use dictionaries and write functions with arguments in Python.	4.1	Student will be able to decompose a Python program into functions.	a,b,c,j,l	
5.0	To learn how to build and package Python modules for reusability and accessing the files.	5.1	Student will be able to read and write data from/to files in Python Programs.	a,b,c,j,k,l	

UNIT I - INTRODUCTION TO PYTHON	(6)
Introduction – Features – Downloading and Installing python - Executing a Python program – Flavors of Python – Memory Management in python – Garbage Collection – Comparisons between C and Python – Comparisons between Java and Python – Datatypes in Python: Comments –Built-in Datatype – bool Datatype – Sequences – Sets – literals – Identifiers and Reserved words – Naming Conventions.	
UNIT II - LANGUAGE COMPONENTS	**(6)**
Condition Statements: if , if-else, if..elif.. else statement. Looping Statement: While – for-Infinite loop – Nested loop - Break – Continue-Pass- Assert – Return. Operators – Input and Output Statements – Array: Creating – Importing the Array Module – Processing the Array – Types of Array – Operations on Arrays – Attributes of an Array- Case studies.	
UNIT III - STRINGS, LISTS AND TUPLES	**(6)**
Strings: Creating – Functions – Indexing - Slicing – Concatenation- Repetition – Membership – Comparing string – Testing Strings – Searching for substrings – Converting Strings – Stripping Whitespace Characters from a string – Formatting strings . Lists: Creating Lists – Updating -Concatenation - Repetition - Methods – Sorting- Nested Lists. Tuples: Creating - Accessing – Operations – Functions - Nested Tuples - Inserting Elements, Modifying Elements, Deleting Elements from a Tuple – Case studies.	
UNIT IV - DICTIONARIES AND FUNCTIONS	**(6)**
Dictionaries: Operations – Methods - Using for Loop with Dictionaries – Sorting the Elements of a Dictionary using Lambdas - Converting Lists and Strings into Dictionary - Passing Dictionaries to Functions - Ordered Dictionaries. Functions: Function Vs. Method - Defining – Calling – Returning - Pass by Object Reference –Arguments : Formal, Actual, Positional, Keyword, Default & Variable Length Arguments. Local and Global Variables - Recursive Functions - Lambdas - Function Decorators – Case studies.	

UNIT V - FILES AND MODULES	(6)
Files - Types of Files - Opening & Closing a File - Working with Text Files Containing Strings - Working with Binary Files - with Statement - seek() and tell() Methods - Random Accessing of Binary Files - Random Accessing of Binary Files using mmap - Zipping and Unzipping Files - Working with Directories. - Modules: Namespaces - Importing Modules – Module Built- in-functions- Standard Modules: math and dir function – Case studies.	

REFERENCES:

1. Dr. R. NageswaraRao, "Core Python Programming", Dreamtech Press, 2017 Edition.
2. Daniel Liang Y, "Introduction to Programming using Python", Pearson Education, 2nd Edition, 2017.
3. Wesley J. Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2010.
4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", Cengage Learning, 2012.

LIST OF EXPERIMENTS

1. Program using Operators
2. Program using Conditional Statements
3. Program using Looping
4. Program using Strings
5. Program using Lists
6. Program using Dictionaries
7. Program using Tuples
8. Program using Functions
9. Program using File handling
10. Program using Modules
11. Develop the simple project

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX03 C# AND .NET FRAMEWORK					
		L	T	P	C
		2	0	2	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn programming language C#	1.1	To understand programming concepts in C#	b,c,h	
2.0	To learn about connectivity with ADO.NET	2.1	To understand about connectivity with ADO.NET.	a,b,c,h	
3.0	To learn about Web services	3.1	To understand designing of various form controls.	b,c,d,h,i	
4.0	To design web applications and web services.	4.1	Be able to design web applications and web services.	b,c,d,h,i	
5.0	To provide knowledge in advanced .NET concepts.	5.1	To understand advanced .NET concepts.	b,h,i,k,l	

UNIT I - INTRODUCTION TO C#	(6)
Understanding .NET Framework - Introducing C# - Overview of C# - Literals – Variables - Data Types – Operators – Expressions - Branching – Looping - Methods - Arrays – Strings – Structures – Enumerations – CLR – Garbage Collector.	
UNIT II - OBJECT ORIENTED ASPECTS OF C#	**(6)**
Classes – Constructors & Destructors – Objects – Inheritance – Polymorphism – Interfaces – Access Specifiers - Operator Overloading - Delegates & Events - Errors and Exceptions.	
UNIT III - WINDOWS APPLICATION DEVELOPMENT ON .NET	**(6)**
Introduction to .NET – Windows Applications: Creation - Execution - Window Forms – Common Controls: Menu controls - MDI Forms – ADO.NET: DataReader - DataSets – DataTables - DataViews – SqlConnection – SqlCommand.	
UNIT IV - WEB BASED APPLICATION DEVELOPMENT ON .NET	**(6)**
Overview of ASP.NET – Developing Web Applications using Master and Content pages – Standard, Validation and Data Controls – Authentication and Authorization – AJAX Controls, State Management - ASP.NET Page Life Cycle.	
UNIT V - MORE .NET CONCEPTS	**(6)**
Assemblies – Versioning – Attributes – Reflection – Advance .NET Concepts: MVC -UWP - WPF – WCF – Web API 2.0 – WF.	

REFERENCES:

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 3rd edition, 2010.
2. Lalit Arora, Anjali Arora, "C# Using .NET Framework", First Edition, 2010.
3. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
4. Chirag Patel," Advance .NET Technology", Dreamtech Press, 2nd Edition, 2011.

LIST OF EXPERIMENTS

1. Programs using Branching, Looping.
2. Programs using Methods, Arrays, Strings.
3. Programs using Structures, Enumerations.
4. Programs using Inheritance.
5. Programs using Polymorphism.
6. Programs using Interfaces.
7. Programs using Operator overloading.
8. Programs using Delegates, Events, Errors and Exceptions.
9. Program to build a Calculator widget
10. Develop a windows application program in .NET
11. Develop a web application program using Data controls and ADO.NET
12. Programs to implement web service in an application.

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX04 UNIX AND NETWORK PROGRAMMING					
		L	T	P	C
		2	0	2	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To learn about basic commands in Unix.	1.1	Students will be able to understand Unix OS environment and gain good understanding of various commands	a,b,k
2.0	To make understand about Unix file system and information.	2.1	Students will be able to get knowledge about the Unix file System..	a,b
3.0	To make understand about the Environment and Processes.	3.1	Students will be able to know about creating processes.	c,d,i,j
4.0	To learn and understand IPC.	4.1	Students will be able to create processes and intercommunication of two processes.	c,d,i,j,l
5.0	To learn about networking in Unix environment through sockets	5.1	Students will be able to create client / server programs through sockets using TCP, UDP and SCTP protocols.	b,j,k,l

UNIT I - INTRODUCTION TO UNIX COMMANDS	(5)
Introduction to Unix File System Directory Hierarchy - vi Editor – General Purpose Utilities: cal – date – calendar – who – passwd – echo. Navigating File System: pwd – cd – mkdir – rmdir – ls. File Handling: cat – cp – rm – mv – lp – wc - cmp – comm – diff. Network Commands: telnet – ftp – rlogin – rcp – rsh. Filters: pr – head – tail – cut – paste – sort. Regular Expressions: grep – egrep – fgrep.	
UNIT II - FILE SYSTEM	**(6)**
Overview of UNIX OS - File I/O - Files and Directories – Standard I/O library – System Data Files and Information.	
UNIT III – PROCESSES	**(6)**
Environment of a UNIX process – Process control – Process Relationships – Signals -Threads.	
UNIT IV - INTERPROCESS COMMUNICATION	**(6)**
Introduction - Message passing (XSI) - Pipes – Co-processes - FIFO – Message Queues – Semaphores –Shared Memory.	
UNIT V – SOCKETS	**(7)**
Introduction Socket - TCP Sockets – UDP Sockets – SCTP Sockets – Socket Options - I/O Multiplexing - Name and Address Conversions.	

REFERENCES:

1. W.Richard Stevens, Stephen A. Rago, "Advanced Programming in the UNIX Environment", Third Edition, Pearson Education Inc., 2013.
2. W.Richard Stevens, Bill Fenner, Andrew Rudoff, "Unix Network Programming - The Sockets Networking API, Volume 1, Third Edition, Pearson Education, 2014.
3. Sumitabha Das, "Your UNIX/Linux: The Ultimate Guide", Third Edition, Tata-McGraw Hill Education, 2012.
4. Christopher Negus,Christine Bresnahan, "Linux Bible", Eighth Edition, Wiley Publications, 2012.

LIST OF EXPERIMENTS

1. Program using Simple Unix Commands
2. Program using basic Network Commands
3. Program using System Calls : create, open, read, write, close, stat, fstat, lseek
4. Program to implement Inter Process Communication using Pipes.
5. Program to perform Inter Process Communication using Message Queues.
6. Program to perform Inter Process Communication using Shared Memory.
7. Program to perform Synchronization using Semaphores.
8. Program to capture packets : Sniffer.
9. Program using TCP sockets (Client and Server).
10. Program using UDP sockets (Client and Server).

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX05 OBJECT ORIENTED PROGRAMMING IN JAVA – II					
		L	T	P	C
		2	0	2	3
PREREQUISITE: 17CAX01					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To learn about basic concepts and generic types of java	1.1	Students will be able to understand about Generics and collections.	b,c,h
2.0	To learn about Applets and events.	2.1	Students will be able to create Applets and demo event handling.	a,b,c,h
3.0	To provide knowledge of GUI in java	3.1	Students will be able to develop GUI with Swings, Container and Layout panels.	b,c,d,h,i
4.0	To provide knowledge on Database Connectivity.	4.1	Students will be able to understand and use JDBC and Application with DB.	b,c,d,h,i
5.0	To learn about RMI	5.1	Students will be able to implement RMI and do Case Studies.	b,h,i,k,l

UNIT I - GENERICS AND COLLECTIONS	**(6)**
Generics: Basics and Generic Type safety – Collection Interfaces: Collection, Set, List, Queue – Collection classes: Array List, Hash Set, Tree Set – Iterators: Map Interface – Map Classes.	
UNIT II - APPLETS AND EVENTS	**(6)**
Applet basics – Applet Architecture –Initialization & Termination – Event Handling – More Java Keywords.	
UNIT III – GUI	**(6)**
Introduction to Swing – Containers – Components – Container pane - Layout Managers – Swing Applet - Case study.	
UNIT IV - JDBC AND APPLICATION WITH DB	**(6)**
Introduction to JDBC – Connecting various DB with Java – Accessing DB using Java – Case study.	
UNIT V – RMI	**(6)**
Introduction to RMI – Designing RMI Application – Executing RMI Application – Case study.	

REFERENCES:

1. Herbert Schildt, "The Complete Reference (Fully updated for jdk7)", Oracle Press, Ninth Edition, 2014.
2. Cay S. Horstmann, "Core Java Volume –I Fundamentals", Prentice Hall , 10th Edition, 2015.
3. Deitel & Deitel, "Java How to Program", Prentice Hall, 10th Edition, 2016.
4. Herbert Schildt , "Java: A Beginner's Guide", Oracle Press, Sixth Edition, 2014.

LIST OF EXPERIMENTS

1. Programs on Generics
2. Programs on Collections
3. Programs on Applets
4. Programs on Events
5. Programs on Swing
6. Programs on JDBC
7. Creating Applications with DB
8. Programs on RMI

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX06 OBJECT ORIENTED PROGRAMMING WITH PYTHON				
L	T	P	C	
2	0	2	3	

PREREQUISITE: 17CAX02

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To impart fundamental concepts of OOP using python.	1.1	The students will be able to understand the basics of object oriented concepts in python.	a,c,l
2.0	To gain exposure about inheritance and polymorphism.	2.1	The students will be able to develop applications using inheritance and polymorphism.	a,b,c,d,e,k,l
3.0	To understand the abstract data types and tree data structures	3.1	The students will be able to implement the ADTs and trees.	a,b,c,d,e,k,l
4.0	To see how graphs and heaps can be used to solve a wide variety of problems.	4.1	The students will be able to design graph abstract data type and heap.	a,b,c,d,e,k,l
5.0	To understand the sorting techniques and shortest path algorithms.	5.1	The students will be able to implement the sorting techniques and shortest path algorithms.	a,b,c,d,e,k,l

UNIT I - MOTIVATION OF FUNDAMENTAL CONCEPT IN PROGRAMMING	**(6)**
Implementation of Classes and Objects in Python - Class Attributes and Instance Attributes - 'self ' parameter - Static Methods and Instance Methods - init() method.	
UNIT II - ADVANCED FEATURES IN CONCEPT OF PROGRAMMING	**(6)**
Performing Abstraction and Encapsulation in Python - Single Inheritance - Multiple Inheritance - Multilevel Inheritance - Public, Protected and Private - Naming Conventions. Polymorphism- Overriding and the super() method - Diamond Shape Problem in Multiple Inheritance - Overloading an Operator - Implementing an Abstract Base Class (ABC)	
UNIT III - INTRODUCTION TO ALGORITHMIC THINKING AND PEAK FINDING	**(6)**
Array data structure - Linked List Data Structure and Its Implementation - Stacks and Queues - Binary Search Trees - Balanced Trees: AVL Trees and Red-Black Trees.	
UNIT IV - MAPPING VALUES AND PRINCIPLE OF OPTIMALITY	**(6)**
Heaps - Heapsort Algorithm - Associative Arrays and Dictionaries - Ternary Search Trees as Associative Arrays - Basic Graph Algorithms - Breadth - First And Depth - First Search - Spanning Trees.	
UNIT V - ANALYZING NUMBER OF EXCHANGES IN CRAZY-SORT	**(6)**
Shortest Path Algorithms, Dijkstra's Algorithm - Bellman-Ford Algorithm - Kruskal Algorithm - Sorting Algorithms- Bubble Sort, Selection Sort and Insertion Sort – Quick sort and Merge Sort, Non-Comparison Based Sorting Algorithms, Counting Sort and Radix Sort.	

REFERENCES:

1. Dusty Phillips, Python 3 Object-oriented Programming, Packt Publishing, Second Edition.
2. Bradley N. Miller, David L. Ranum,- Problem Solving with Algorithms and Data Structures Using Python, Franklin, Beedle & Associates, 2011.
3. Mark Summerfield - Programming in Python 3, Pearson Education, 2nd Edition.
4. Michael T. Goodrich, Irvine Roberto Tamassia, Michael H. Goldwasser, - Data Structures and Algorithms in PythonII, 2013 edition.

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LIST OF EXPERIMENTS

1. Implementation of Stack.
2. Implementation of Queue.
3. Implementation of Linked List.
4. Implementation of AVL tree.
5. Implementation of Breadth - First / Depth - First Search.
6. Implementation of Quick sort/Merge Sort.
7. Implementation of Bubble Sort/Insertion Sort.
8. Implementation of Dijkstra's Algorithm.
9. Implementation of Kruskal Algorithm.
10. Implementation of Bellman- Ford Algorithm.

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX07 RUBY ON RAILS FRAMEWORK					
		L	T	P	C
		2	0	2	3
PREREQUISITE: 17CAX01 / 17CAX02					
COURSE OBJECTIVES AND OUTCOMES:					

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To understand programming constructs of Ruby.	1.1	Students will be able to write programs and know about Ruby Gem.	b,c,d,k
2.0	To learn Rails Framework and to use Rails conventions to avoid redundant code.	2.1	Students will be able to develop application in Ruby on Rail.	b,c,d,i,k
3.0	To learn about model, view and control.	3.1	Students will be able to know how to work with database, implement code and view data.	b,c,d,i,k
4.0	To deploy Ruby on Rails.	4.1	Students will be able to apply knowledge to deploy Rails.	b,c,i,k,l
5.0	To learn about advanced concepts in Rails.	5.1	Students will be able to know about prototype, generators, pagination, RESTful rail, etc.,	b,c,i,k,l

UNIT I PROGRAMMING IN RUBY	**(6)**
What's Ruby? – Hello Application – Nature of Ruby – Object Oriented Programming – Ruby basics – Classes, Objects and Variables – Built-in Classes and Modules: Scalar Objects – Collections. Control Flow: Conditionals – Loops, Blocks, and Iterators – Exception handling – Advanced Ruby Techniques – Introduction to Ruby Gem – Metaprogramming.	
UNIT II - RAILS FRAMEWORK	**(6)**
What Is Rails?- History of Rails- Installing Rails on Windows, Linux – Setting Development Environment – What is Ruby on Rails – Rails Architecture – Rails Scripts – Creating First Rails Application.	
UNIT III - MODEL, VIEW AND CONTROL	**(6)**
Active Record – Basics – Setting up a Model – Migrations – CRUD Operations – Defining Relationships – implementing Validations – Custom Validations – Advanced Active Record. ActionController – Routing – Creating and using Controllers – Using Filters – Working with Sessions – Caching. ActionView – Embedded Ruby – Layouts – Partials – Helpers – JavaScript, Ajax and RJS - Associations and Callbacks.	
UNIT IV - DEVELOPING RAILS APPLICATION	**(6)**
Developing Book Shelf: Application Overview – Creating a Skeleton – Create Home Page – Implementing Users. Adding Core Functionality: Adding Support – Refactor Sidebar Code – Implementing Search – Implementing Addition and Deletion Operations – Display content. Testing Application: Using Test::Unit – Testing Rails – Test Database – Functional Test – Unit Tests – Integration Tests – Running, Test Coverage and Debugging Techniques.	
UNIT V - ADVANCED CONCEPTS IN RAILS	**(6)**
Prototype : Overview – Extension to JavaScript – OOP with Prototype – Event Handling - Ajax. Script.aculo.us: Overview – Visual Effects – Controls – Drag and Drop – JavaScript Testing. Extending Rails: Generators – Plugins – Writing Plugins – Techniques used to develop plugins – Pagination – exception_notifier – Adding User Authentication. RESTful Rails – Working with Legacy Databases – Using ActionMailer – ActiveResource and XML – Deploying with Capistrano.	

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REFERENCES:

1. Timothy Fisher, "Ruby on Rails Bible", Wiley India Pvt. Ltd., 2009.
2. Chad Pytel, Tammer Saleh," Rails AntiPatterns: Best Practice Ruby on Rails Refactoring", Addison-Wesley, First Edition, 2010.
3. David A. Black, "The Well-Grounded Rubyist", Manning Publications, Second Edition, 2014.
4. Peter Cooper, "Beginning Ruby: From Novice to Professional", Apress, Third Edition, 2016.

LIST OF EXPERIMENTS

1. Create a Ruby program using conditional and looping statements.
2. Create a Ruby program using string objects.
3. Create a Ruby program using Collections such as arrays, hashes and ranges.
4. Create a ruby program with classes, objects, getter and setter.
5. Create a ruby program that handles File Operations.
6. Create ruby program that connect with database to perform CRUD operation.
7. Create a ruby program with inheritance and modules.
8. Create a rails application with some static web pages.
9. Create a rails application for basic authentication with sign-in and sign-out, user must sign in to see the content.
10. Create a rails application for real time application like online shopping, micro blog, etc.

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX08 XML & WEB SERVICES					
		L	T	P	C
		2	0	2	3
PREREQUISITE: 17CAB13					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Programme Outcomes**	
1.0	To learn about XML technology	**1.1**	To understand programming concepts in XML.	**a,b,d**	
2.0	To learn about concepts of web services	**2.1**	To understand about web Services	**a,b,d,i,k**	
3.0	To learn about implementing XML in E-Business	**3.1**	To understand about XML in E-Business	**c,d,i,j**	
4.0	To learn about XML in E-Business	**4.1**	To understand XML in E-Business	**b,c,k,l**	
5.0	To learn about XML and content management .	**5.1**	To understand XML and content management	**b,h,i,k,l**	

UNIT I - XML TECHNOLOGY FAMILY	**(6)**
XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ.	
UNIT II - ARCHITECTING WEB SERVICES	**(6)**
Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime.	
UNIT III - WEB SERVICES BUILDING BLOCK	**(6)**
Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services- Overview of RESTful.	
UNIT IV - IMPLEMENTING XML IN E-BUSINESS	**(6)**
B2B - B2C Applications – Different types of B2B interaction – Components of ebusiness XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.	
UNIT V - XML AND CONTENT MANAGEMENT	**(6)**
Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL-Marshalling and Unmarshalling.	

REFERENCES:

1. Ron schmelzer et al, "XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.
3. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
4. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.

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5. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
6. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress, 2003.

LIST OF EXPERIMENTS

1. Create an XML document to store an address book.
2. Create an XML document to store information about books and create the DTD files.
3. Create an XML schema for the book's XML document.
4. Create an XML document to store resumes for a job web site and create the DTD file.
5. Present the book's XML document using cascading style sheets (CSS).
6. Write an XSLT program to extract book titles, authors, publications, book rating from the book's XML document and use formatting.
7. Use Microsoft DOM to navigate and extract information from the book's XML document.
8. Use Microsoft DSO to connect HTML form or VB form to the book's XML document and display the information.
9. Create a web service for temperature conversion with appropriate client program.
10. Create a web service for currency conversion with appropriate client program.

TOTAL (T: 30+L:30) = 60 PERIODS

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17CAX28 PROBLEM SOLVING AND ALGORITHMIC SKILLS (Common to 17ITX26)				
L	T	P	C	
2	0	2	3	

PREREQUISITE: NIL	QUESTION PATTERN : TYPE – 1

COURSE OBJECTIVES AND OUTCOMES

Course Objectives		Course Outcomes		Related Program Outcomes
1.0	To impart fundamental concepts of OOP using python	1.1	The students will be able to understand the basics of object oriented concepts in python.	a,c,l
2.0	To gain exposure about inheritance and polymorphism	2.1	The students will be able to develop applications using inheritance and polymorphism	a,b,c,d,e,k,l
3.0	To understand the abstract data types and tree data structures	3.1	The students will be able to implement the ADTs and trees	a,b,c,d,e,k,l
4.0	To see how graphs and heaps can be used to solve a wide variety of problems	4.1	The students will be able to design graph abstract data type and heap	a,b,c,d,e,k,l
5.0	To understand the sorting techniques and shortest path algorithms.	5.1	The students will be able to implement the sorting techniques and shortest path algorithms.	a,b,c,d,e,k,l

UNIT I - MOTIVATION OF FUNDAMENTAL CONCEPT IN PROGRAMMING	**(9)**
Implementation of Classes and Objects in Python - Class Attributes and Instance Attributes - 'self ' parameter - Static Methods and Instance Methods - init() method	
UNIT II - ADVANCED FEATURES IN CONCEPT OF PROGRAMMING	**(9)**
Performing Abstraction and Encapsulation in Python - Single Inheritance - Multiple Inheritance - Multilevel Inheritance - Public, Protected and Private - Naming Conventions. Polymorphism- Overriding and the super() method - Diamond Shape Problem in Multiple Inheritance - Overloading an Operator - Implementing an Abstract Base Class (ABC)	
UNIT III - ALGORITHMIC THINKING AND PEAK FINDING	**(9)**
Array data structure - Linked List Data Structure and Its Implementation - Stacks and Queues - Binary Search Trees - Balanced Trees: AVL Trees and Red-Black Trees	
UNIT IV - MAPPING VALUES AND PRINCIPLE OF OPTIMALITY	**(9)**
Heaps - Heapsort Algorithm - Associative Arrays and Dictionaries - Ternary Search Trees as Associative Arrays - Basic Graph Algorithms - Breadth - First And Depth - First Search - Spanning Trees	
UNIT V - ANALYZING NUMBER OF EXCHANGES IN CRAZY-SORT	**(9)**
Shortest Path Algorithms, Dijkstra's Algorithm - Bellman-Ford Algorithm - Kruskal Algorithm - Sorting Algorithms- Bubble Sort, Selection Sort and Insertion Sort - Quicksort and Merge Sort, Non-Comparison Based Sorting Algorithms, Counting Sort and Radix Sort.	
TOTAL (L: 45) = 45 PERIODS	

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REFERENCES:

1. Dusty Phillips, Python 3 Object-oriented Programming, Packt Publishing, Second Edition.
2. Bradley N. Miller, David L. Ranum,- Problem Solving with Algorithms and Data Structures Using Python, Franklin, Beedle & Associates, 2011.
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LIST OF EXPERIMENTS

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6. Implementation of Quick sort/Merge Sort.
7. Implementation of Bubble Sort/Insertion Sort.
8. Implementation of Dijkstra's Algorithm.
9. Implementation of Kruskal Algorithm.
10. Implementation of Bellman- Ford Algorithm.

TOTAL (T: 30+L:30) = 60 PERIODS

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PROFESSIONAL ELECTIVES (PE) – E3

17CAX09 MOBILE APPS DEVELOPMENT				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To obtain knowledge in Android Platform.	1.1	Students will be able to gain knowledge in various Mobile App developments Environment.	a,b,c,d
2.0	To understand the fundamentals about the building blocks of Mobile Apps.	2.1	Students will be able to understand about interface designing and SQLite Database.	a,e,f,g
3.0	To provide knowledge in the role of Multimedia in Mobile Apps.	3.1	Students will be able to extract knowledge in Audio/Video playback and Record during App development.	f,g,h
4.0	To learn about various types of Testing involved in Mobile Apps.	4.1	Students will be able to apply knowledge in various testing during App development.	i,j,k
5.0	To obtain knowledge in how to taking Apps to market.	5.1	Students will be able to gain awareness about distributing apps on mobile market place.	i,j,k,l

UNIT I - GETTING STARTED WITH MOBILITY	**(9)**
Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development.	
UNIT II - BUILDING BLOCKS OF MOBILE APPS	**(9)**
App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities. App functionality beyond user interface - Threads, Async task, Services – states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs. Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet).	
UNIT III - SPRUCING UP MOBILE APPS	**(9)**
Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope).	
UNIT IV - TESTING MOBILE APPS	**(9)**
Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk.	
UNIT V - TAKING APPS TO MARKET	**(9)**
Versioning, signing and packaging mobile apps, distributing apps on mobile market place.	
	TOTAL (L: 45) = 45 PERIODS

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REFERENCES:

1. Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development", First Edition, 2013.
2. Barry Burd, "Android Application Development All in one for Dummies", First Edition, 2013.
3. "Teach Yourself Android Application Development in 24 Hours", SAMS Publication.

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17CAW01 MOBILE APPS DEVELOPMENT LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To gain knowledge about the uses of Layout Managers and Event Listeners.	1.1	Students will be able to understand the working Layout Managers and Event Listeners.	a,b,c,d,k	
2.0	To impart the uses of Adapters and Toast.	2.1	Students will be able to understand the basics Adapters and Toast.	a,b,c,j,k	
3.0	To get knowledge about how to create Database.	3.1	Students will be able use of Database.	b,c,d,j,l	
4.0	To get knowledge about Multi-threading.	4.1	Students will be able to implementing Multi-Threading.	b,c,d,e	
5.0	To get practice in developing Game Applications.	5.1	Students will be able to design various Applications.	b,c,d,j,l	

LIST OF EXPERIMENTS

1. Develop an application that uses Layout Managers.
2. Develop an application that uses event listeners.
3. Develop an application that uses Adapters, Toast.
4. Develop an application that makes use of database.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi-threading.
7. Develop a native application that uses GPS location information.
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message.
10. Develop a game application.

TOTAL (L:60) = 60 PERIODS

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17CAX10 CLOUD SUITE BUSINESS AND SYTELINE ENVIRONMENT				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To provide knowledge about user interface	1.1	Students will be able to create form view and retrieve data.	a,b,c,k
2.0	To provide knowledge about foundation of business.	2.1	Students will be able to do entries in various business transactions.	a,b,c,k,l
3.0	To provide basics of database administration and personalization.	3.1	Students will be able to customize data in the database.	b,c,k,i,j
4.0	To provide overview of Mongoose environment.	4.1	Students will be able to do data maintenance, data view and data search.	a,b,c,k
5.0	To provide knowledge about report creation in Mongoose environment.	5.1	Students will be able to report configuration and authorization.	b,c,i,k,l

UNIT I - CLOUDSUITE BUSINESS USER INTERFACE	**(9)**
Introduction: Forms, Records, Fields and Collections – The Explorer- Form View – Form modes – Customizing menu and My Folder –Autorun and PreLoad- Workspace creation – Pin and Unpin – Retrieving data – various operations on records –Notes.	
UNIT II - CLOUDSUITE BUSINESS FOUNDATION	**(9)**
Financials, Customers, Items and Vendors – Customer order - Purchase order requisition – Purchase Order – Shipping – Invoice – Accounts Receivable- Accounts Payable –Vouchers – Journal Entries – General Ledger – Reviewing financials.	
UNIT III - ADMINISTRATION AND SYTELINE FORM PERSONALIZATION	**(9)**
Framework – Database- Taskman service – background task – Audit trails – Utilities – System data architecture – Customizing form components – inherited attributes –list sources –validators – Strings customization –User Extended tables (USTs) – Event Handlers.	
UNIT IV - EXTENDING WITH MONGOOSE AND WORKBENCH	**(9)**
System development environment – design mode – Cost Centers data Maintenance – Employee data maintenance – Expense Report – IDO – Workbench – Data Views – Data Search – Critical Numbers – Data View Actions.	
UNIT V - SSRS AND MONGOOSE APPLICATION FOUNDATION	**(9)**
SQL Server Reporting Services (SSRS) overview – BIDS - Syteline Configuration for reports – Report Authorization – Report Server administration – Mongoose Topology – Licensing – Runtime Basics – Access As Identifier – Runtime UI – Derived property classes – Query forms – Sub collections – Issues data maintenance – Global objects – Issues form.	
TOTAL (L: 45) = 45 PERIODS	

REFERENCE:

1. InforCloudSuite Business / Syteline v9 Foundation 101.

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17CAW02 CLOUD SUITE BUSINESS AND SYTELINE ENVIRONMENT LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To provide knowledge about user interface	1.1	Students will be able to create form view and retrieve data.	a,b,c,k	
2.0	To provide knowledge about foundation of business.	2.1	Students will be able to do entries in various business transactions.	a,b,c,k,l	
3.0	To provide basics of database administration and personalization.	3.1	Students will be able to customize data in the database.	c,k,i,j,l	
4.0	To provide overview of Mongoose environment.	4.1	Students will be able to do data maintenance, data view and data search.	b,c,i,k,l	
5.0	To provide knowledge about report creation in Mongoose environment.	5.1	Students will be able to report configuration and authorization.	b,c,i,k,l	

LIST OF EXPERIMENTS

1. Working with forms records and Interface
2. Adding, Deleting and Editing records
3. Setting up financials, customers, items and vendors
4. Creating customer orders, purchase orders and invoicing
5. Paying invoices and vouchers
6. Posting General Ledger
7. Creating users with various scope levels and license module
8. Customizing the form components with list and validators
9. Working with NDMW
10. Working on Workbenches

TOTAL (L:60) = 60 PERIODS

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17CAX11 INTERNET OF THINGS AND ITS APPLICATIONS
(Common to 17ECX16)

L	T	P	C
3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To make the students to know about basics of Electrical and Electronic devices.	1.1	Students will be able to understand basics of Electrical circuits and Electronic devices	a,c,d,i
2.0	To make the students to know about basics and block diagram of IoT.	2.1	Students will be able to understand IOT characteristics and its essential components.	a,b,d,e
3.0	To make the students to know about Arduino processor and working of Analog and Digital I/O pins.	3.1	Students will be able to describe Arduino processor and working of Analog and Digital I/O pins.	a,b,c,g
4.0	To make the students to know about Raspberry pi and its interface with other devices.	4.1	Students will be able to understand Raspberry pi and its interface with other devices.	a,b,c,j
5.0	To motivate the students to implement the IoT using Arduino/ Raspberry Pi.	5.1	Students will be able to implement a IoT system using Arduino/Raspberry Pi.	a,f,k,l

UNIT I - BASIC ELECTRICAL CIRCUITS AND ELECTRONICS	**(9)**
Introduction - Current, voltage and resistance - Analog and Digital Signal - conductors Vs Insulators – KCL- KVL - Basic Electronics components - calculating equivalent resistance for series and parallel circuits- Ohm's law- Color coding for a resistor – LED – LCD - LDR.	
UNIT II - INTRODUCTION TO INTERNET OF THINGS	**(9)**
Introduction - Definition and characteristics of Internet of Things - General Block Diagram and essential components of IOT - Role of microprocessor & Micro controller- communication of things - IOT connection with internet.	
UNIT II - PROGRAMMING USING ARDUINO	**(9)**
Introduction to Arduino processor- General Block diagram- Working of Analog and Digital I/O pins- Serial (UART) , I2C Communications and SPI communication - Arduino Boards: Mega, Due, Zero and 101 - Prototyping basics - Technical description - Setting Up Arduino IDE- Introduction to Arduino programming.	
UNIT IV – PROGRAMMING USING RASPBERRY PI	**(9)**
Technical Description of Raspberry Pi - comparison of Raspberry Pi Vs Arduino - Operating Systems for RPi - Preparing SD Card for Pi - Connecting Raspberry Pi as PC - Exploring Raspberry Pi Environment- Logical design using Python.	
UNIT V- APPLICATIONS OF IOT	**(9)**
Various Real time applications of IoT- automation - Smart Parking - Environment: Weather monitoring system - Agriculture: Smart irrigation – Domain Specific applications.	
	TOTAL (L: 45) = 45 PERIODS

REFERENCES:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015.
2. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, (2006).
3. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", Wiley Publications 2nd edition, 2013.
4. Marco Schwartz, – Internet of Things with the Arduino Yun, Packt Publishing, 2014.
5. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2012.

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17CAW03 INTERNET OF THINGS LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To understand the fundamentals of LED and light intensity control.	1.1	Students will be able to acquire knowledge about Arduino, LED and control intensity of light.	a,b,c,k	
2.0	To understand about the components such as Buzzer and LCD.	2.1	Students will be able to implement buzzer and LCD in applications.	a,b,c,i,k	
3.0	To understand how to work with sensors such as temperature and LDR.	3.1	Students will be able to implement LM35 sensor, LDR in applications.	a,b,c,i,k	
4.0	To understand about key input and servo motor.	4.1	Students will be able to implement the way to blink LED through key input and working with servo motor.	a,b,c,i,k,l	
5.0	To understand the concept NODEMCU with app and sensor value to upload in Cloud.	5.1	Students will be able to implement applications with NODEMCU with Blynk app and upload sensor value in Cloud.	a,b,c,i,k,l	

LIST OF EXPERIMENTS

1. Implement a program to Blink LED using Arduino.
2. Implement a program to control intensity light using Arduino.
3. Implement a program for LCD Display using Arduino.
4. Implement a program for Buzzer Indication using Arduino.
5. Implement a program for LDR using Arduino.
6. Implement a program for LM35 Sensor using Arduino.
7. Implement a program for Key Input with LED using Arduino.
8. Implement a program for Servo Motor Control using Arduino.
9. Implement a program for blinking LED using NODEMCU with Blynk.
10. Implement a program for Sensor value logging in Cloud.

TOTAL (P:60) = 60 PERIODS

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17CAB14 BIG DATA ANALYTICS					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB11					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Programme Outcomes**	
1.0	To learn tips and tricks for Big Data use cases and solutions..	**1.1**	Students will get knowledge about the basic terminology of Big Data Analytics.	**a,b,c**	
2.0	To understand data analysis methods.	**2.1**	Students will get knowledge of Data mining tool and practical experience of applying data mining algorithms.	**b,c,d**	
3.0	Understand the basics of R programming including vectors, list, etc.	**3.1**	Students will be able to recognize and make appropriate use of different types of data structures	**a,b,c**	
4.0	Become proficient in writing a fundamental program and perform analytics with R	**4.1**	Students will be able to design and write functions in R and to create sophisticated figures and graphs	**a,b,c**	
5.0	Learn to build and maintain reliable, scalable, distributed systems with Hadoop.	**5.1**	Students will able to apply Hadoop ecosystem components.	**a,c,k**	

UNIT I – INTRODUCTION	**(8)**
Introduction – Characteristics and Considerations – Data Structures – Business drivers – Business intelligence Vs Data science – Analytical Architecture –Key Roles of the New Big Data Ecosystem – Data Scientist - Big Data Applications.	
UNIT II - DATA ANALYTICS LIFECYCLE	**(8)**
Data Analytics Lifecycle: Discovery-Data preparation – Model Planning – Model Building – Communicate results – Operationalize - Key Roles for a Successful Analytic Project - Case Studies.	
UNIT III - ADVANCED ANALYTICS THEORY AND METHODS	**(10)**
Association Rules: Apriori Algorithm - Evaluation of Candidate Rules -Applications of Association Rules - Regression: Linear Regression – Logistic Regression	
UNIT IV - R PROGRAMMING: INTRODUCTION	**(10)**
Overview – Environment Setup – Data Types – Variables – Operators – Decision Making – Loops Statements – Function – Strings – Vectors: Scalars, Recycling, Operations – Function: All and Any, Vectorized operations, NA and NULL values, Filtering , Vectorized if-then else, Vector Equality, Vector Element names. Lists: Creation, Operations – Accessing List Components and Values, Applying functions to lists, Recursive List. Matrices: Creation, Operations – Applying functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction-Avoiding Dimension Reduction, Higher Dimensional arrays.	
UNIT V - ARRAYS,DATA FRAMES,INTERFACING AND GRAPHICS	**(9)**
Arrays: Creating, Accessing, Manipulating Array Elements – Factors: Factors and Tables, Factors and Levels, Functions, Working with tables. Data Frames: Creation, Matrix-like Operations, and Merging Data frames – Applying functions to Data Frames. R Data Interfaces: CSV Files – Excel files – Databases. Graphics: Creating Graphs, Customizing Graphs, Saving graphs to files, Creating three-dimensional plots. Charts: Pie chart – Bar Chart – Box plots – Histograms – Line Graphs – Scatter plots.	
TOTAL (L: 45) = 45 PERIODS	

REFERENCES:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", John Wiley & Sons Publications.
2. Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, 2011.
3. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
4. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc., 2012.

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17CAB15 MACHINE LEARNING				
	L	T	P	C
	3	0	0	3

PREREQUISITE: 17CAB11

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To understand the basic concepts of machine learning.	1.1	Students will be able to acquire knowledge about the types of machine learning and its functions.	a,b
2.0	To learn about linear algorithms	2.1	Students will be able to acquire knowledge for predicting real values, and classification of problems.	b,c,j
3.0	To learn about non-linear algorithms	3.1	Students will be able to understand various predictive modeling machine learning.	b,c,j
4.0	To know about various model representations such as KNN, LVQ and SVM.	4.1	Students will be able to understand entire training dataset.	b,c,j
5.0	To understand about Hidden Markov Models.	5.1	Students will be able to use HMM by Speech Recognition and Part-of-Speech Tagging, and Information Extraction.	b,c,j

UNIT I - MACHINE LEARNING AND ITS TECHNIQUES	(9)
Machine Learning–Data in Machine Learning - Statistical Learning Perspective - Computer Science Perspective - Models and Algorithms - Learning a Function - Learning a Function to Make Predictions - Techniques for Learning a Function - Parametric and Nonparametric Machine Learning Algorithms - Supervised, Unsupervised and Semi-Supervised Learning - Bias-Variance Trade-Off - Overfitting and Underfitting.	
UNIT II - LINEAR ALGORITHMS	**(9)**
Spreadsheet Math - Gradient Descent - Batch Gradient Descent - Stochastic Gradient Descent - Linear Regression – Learning the Model - Making Predictions with Linear Regression - Logistic Regression – Linear Discriminant Analysis (LDA) - Learning LDA Models - Making Predictions with LDA.	
UNIT III - NON-LINEAR ALGORITHMS	**(9)**
Classification and Regression Trees (CART) - Model Representation – Naive Bayes – Naive Bayes Classifier – Gaussian Naive Bayes – Gaussian Probability Density Function – Make Predictions with Naïve Bayes and Gaussian Naïve Bayes.	
UNIT IV - KNN, LVQ AND SVM	**(9)**
K-Nearest Neighbors (KNN) – KNN Model Representation – Curse of Dimensionality – KNN and Euclidean Distance – Learning Vector Quantization (LVQ) – LVQ Model Representation – Make Predictions with LVQ – Support Vector Machines (SVM) – Maximal-Margin Classifier - Soft Margin Classifier – Kernels - Training SVM With Gradient Descent - Make Predictions with SVM Model.	

UNIT V - LANGUAGE LEARNING	(9)
Overview of Hidden Markov Models (HMM's) - Overview of Forward-backward EM algorithm for training the parameters of HMM's - Use of HMM's: Speech Recognition, Part-of-Speech Tagging, and Information Extraction - Conditional Random Fields (CRF's) - Probabilistic Context-Free Grammars (PCFG) - Parsing and learning with PCFGs - Lexicalized PCFGs.	
	TOTAL (L: 45) = 45 PERIODS

REFERENCES:

1. Jason Brownlee, "Master Machine Learning Algorithms – Discover How They Work and Implement Them From Scratch", Machine Learning Mastery, Edition v1.1, 2016.
2. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, New York, 2006.
3. Max Kuhn and Kjell Johnson, "Applied Predictive Modeling", Springer, New York, 2013.

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17CAB16 SOFTWARE PROJECT MANAGEMENT					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	Outline the project planning for the software process.	1.1	Express the Project planning and estimation activities during the project scheduling of any software application.	a,b,c	
2.0	Describe the project evaluation and costing of the project.	2.1	Practice the knowledge about project evaluation and costing of the project.	b,c,d	
3.0	Explain the quality concepts for ensuring the functionality of the software	3.1	Predict the knowledge to create reliable, replicable costestimation that links to the requirement of project planning and managing.	a,d,k	
4.0	Review the risk management and resource allocation.	4.1	Solve the Risk and create risk mitigation plan.	b,c,l	
5.0	Illustrate the use of Software Quality management	5.1	Apply software quality management for better quality software delivery	b,d,k	

UNIT I - SOFTWARE PROJECT MANAGEMENT CONCEPTS	(9)
Introduction to software project management: An Overview of Project Planning: Select Project, Identifying Project Scope and objectives, infrastructure, project products and characteristics. Estimate efforts, Identify activity risks, and Allocate resources.	
UNIT II - SOFTWARE EVALUATION AND COSTING	**(9)**
Project Evaluation: Strategic Assessment, Technical Assessment, Cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Selection of an Appropriate Project approach: Choosing technologies, choice of process models, structured methods.	
UNIT III - SOFTWARE ESTIMATION AND TECHNIQUES	**(9)**
Software Effort Estimation: Problems with over and under estimations, Basis of Software Estimation, Software estimation techniques, expert judgement, Estimation by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, Networks planning models, formulating a network model.	
UNIT IV - RISK MANAGEMENT	**(9)**
Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost Scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.	
UNIT V - SOFTWARE QUALITY MANAGEMENT	**(9)**
Defining Software Quality - ISO9126 – Product and Process Metrics – Product vs Process Quality Management – Quality Management Systems – Process Capability Models – Techniques to help enhance Software Quality – Testing – Software Reliability – Quality Plans.	
TOTAL (L: 45) = 45 PERIODS	

REFERENCES:

1. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw – Hill Publications, Fifth Edition, 2012.
2. S.A. Kelkar, "Software Project Management", PHI, New Delhi, Third Edition, 2013.
3. Richard H. Thayer, "Software Engineering Project Manangement", IEEE Computer Society.
4. Futrell, "Quality Software Project Management", Pearson Education India, 2008.

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17CAB12 CYBER SECURITY					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB09					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To impart knowledge in Cyber Security.	1.1	Students will be able to understand various types of attacks in networks.	a,b,c,d
2.0	To understand the various security measures in operating system and networks.	2.1	Students will be able to gain awareness about security design in operating system and denial of service in network.	a,d,c
3.0	To provide knowledge in Security Counter Measures	3.1	Students will be able to know about Firewalls and Prevention methods.	d,e,f
4.0	To understand about Privacy in Cyberspace.	4.1	Students will be able to apply a various emerging technologies in cyberspace.	g,h,i
5.0	To provide knowledge in Management and Incidents.	5.1	Students will be able to understand security planning and dealing with disaster.	j,k,l

UNIT I - INTRODUCTION TO CYBER SECURITY	**(9)**
Introduction – Computer Security – Threats – Harm – Vulnerabilities – Controls – Authenticate Access Control and Cryptography – Web-User Side – Browser Attacks – Web Attacks Targeting Users – Obtaining User or Website Data – Email Attacks.	
UNIT II - SECURITY IN OPERATING SYSTEM & NETWORKS	**(9)**
Security in Operating Systems – Security in the Design of Operating Systems – Rootkit – Network security attack – Threads to Network Communications – Wireless Network Security – Denial of Service – Distributed Denial-of-Service.	
UNIT III - DEFENCES: SECURITY COUNTER MEASURES	**(9)**
Cryptography in Network Security – Firewalls – Intrusion Detection and Prevention Systems – Network Management – Databases – Security Requirements of Databases – Reliability and Integrity – Database Disclosure – Data Mining and Big Data – Mobile Platform and Application Security.	
UNIT IV - PRIVACY IN CYBERSPACE	**(9)**
Privacy Concepts – Privacy Principles and Policies – Authentication and Privacy – Data Mining – Privacy on the Web – Email Security – Privacy Impacts of Emerging Technologies – Where the Field is Headed.	
UNIT V - MANAGEMENT AND INCIDENTS	**(9)**
Security Planning –Business Continuity Planning – Handling Incidents – Risk Analysis – Dealing with Disaster – Emerging Technologies – The Internet of Things – Security and Privacy– Economics –Electronic Voting – Cyber Warfare – Cyberspace and the Law – International Laws – Cyber Crime –Cyber Warfare and Home Land Security- Case Study.	
	TOTAL (L: 45) = 45 PERIODS

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REFERENCES:

1. Charles P.Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, "Security in Computing", 5th Edition, Pearson Education, 2015.
2. Lane Thames, Dirk Schaefer "Cybersecurity for Industry 4.0 Analysis for Design and Manufacturing", Springer, 2017.
3. George K.Kostopoulous, "Cyber Space and Cyber Security", CRC Press, 2013.
4. Martti Lehto, Pekka Neittaanmäki, "Cyber Security: Analytics, Technology and Automation", Springer International Publishing, Switzerland 2015.
5. Jeremy Swinfen, "Green Cyber Security: An Introduction for Non - Technical Managers", Routledge Taylor & Francis Group, London and New York, 2015.

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17CAP08 BIG DATA ANALYTICS LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	Understand the basics of R programming including list, vectors etc.	1.1	Students will able to recognize and make appropriate use of different types of data structures	a,b,c	
2.0	Write functions including generic functions using various methods and loops	2.1	Students will be able to Identify and implement appropriate control structures to solve a particular programming problem	a,b,c	
3.0	To understand and appreciate how to summarize large volumes of data effectively by appropriate use of charts.	3.1	Students will be able to use R to create sophisticated figures and graphs.	a,b,c	
4.0	Understanding of the statistical procedures most often used by practicing engineers.	4.1	Students will be able to design efficient algorithms for mining the data from large volumes	b,c,k	
5.0	To understand the various search methods and visualization techniques.	5.1	Students will be able to applying data modeling techniques to large data sets	b,c,k	

LIST OF EXPERIMENTS

1. Use of Control Structures
2. Use of Array and List
3. Use of Strings
4. Use of Matrices
5. Use of Vectors
6. Use of function
7. Use of different Plots
8. Use of Association Rules
9. Use of Logistic Regression
10. Use of Linear Regression

TOTAL (P:60) = 60 PERIODS

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17CAP09 MACHINE LEARNING LABORATORY					
			L	T	P	C
			0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes			Related Programme Outcomes
1.0	To understand about implementation basics of machine learning.	1.1	Students will be able to acquire knowledge about how to develop algorithm by their own.		a,b,c,j,k
2.0	To understand about probability distribution concepts.	2.1	Students will be able to apply probability distribution concepts in dice and coin toss.		a,b,c,j,k
3.0	To code for linear algorithms	3.1	Students will be able to implement for predicting real values, and classification of problems.		a,b,c,j,k
4.0	To code for non-linear algorithms	4.1	Students will be able to implement various predictive modeling machine learning.		a,b,c,j,k,l
5.0	To develop algorithm for various model representations such as KNN, LVQ and SVM.	5.1	Students will be able to implement entire training dataset.		a,b,c,j,k,l

LIST OF EXPERIMENTS

1. Show the probability distribution graph for two throws of a dice.
2. Use the Bernoulli method for Coin toss.
3. Simple Linear Regression with Gradient Descent Algorithm
4. Logistic Regression Algorithm
5. Linear Discriminate Analysis Algorithm
6. Classification and Regression Tree Algorithm
7. Naïve Bayes Algorithm
8. Gaussian Naïve Bayes Algorithm
9. K Nearest Neighbors Algorithm
10. Support Vector Machines Algorithm

TOTAL (P:60) = 60 PERIODS

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17CAE05 MINI PROJECT					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To provide the opportunity to the students to demonstrate independence and originality, to plan and organize a large project over a long period.	1.1	Students will be able to identify the problem and analyze the project requirements.	a,b,c	
2.0	To carry out the opportunity to specialize in specific areas of Computer Applications.	2.1	Students will be able to apply current techniques and software tools necessary for solving complex modules.	c,d,e	
3.0	To provide opportunity to demonstrate a wide range of skills and knowledge learned.	3.1	Students will be able to show their individuality and inspiration in the mini project by designing a specific to real time applications.	e,f,g	
4.0	To work effectively in a team environment to accomplish a common goal.	4.1	Students will be able to improve their individuality and work as team player.	g,h,i	
5.0	To encourage integration of knowledge gained in the previous course.	5.1	Students will be able to interpret the data and synthesis the information to derive conclusion for implementation of project.	j,k,l	

METHODOLOGY	• Maximum four students per batch. • Faculty guide will be allotted for each batch by the HOD. • By mutual discussion, the faculty guide will assign a title in the general /subject area to the student. • Students have to refer the Journals and magazine and collect the published literature. • Using OHP/Power Point, the student has to make presentation for 15 -20 minutes followed by 10 minutes discussion. • Each batch have to do the project and present the progress of the project by two project reviews ,one at the middle and the other near the end of the semester. • The student batches have to write a Technical Report for about 25 -30 pages (Title page, One page Abstract, Review of Research paper under various subheadings, Concluding Remarks and List of References). The technical report has to be submitted to the HOD one week before the final presentation, after the approval of the faculty guide.

	Week	Activity
EXECUTION	I	Allotment of Faculty Guide by the HoD
	II	Collection of Technical papers
	III-IV	Finalizing the title with the approval of Faculty Guide
	V	First Project Review
	VI	Progress of the Project
	VII	Second Project Review
	VIII	Report Preparation
	IX	Report submission
	X-XI	Demo & Final presentation

EVALUATION

- **50% by Continuous Assessment + 50% by end semester examination**
- **4 Hrs/week and 2 credit**

Component	Weightage
First Project Review	25%
Second Project Review	25%
Project Report	30%
Demo & Final presentation	20%
Total	**100%**

TOTAL (P:60) = 60 PERIODS

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17CAX12 PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To understand the core values that shapes the ethical behavior of an engineer.	1.1	Students will be able to deal with complex situations with the people in the society in making the work environment congenial, encouraging and loving.	a,b,d
2.0	To inculcate a spirit of togetherness, unity and team work in an organization.	2.1	Students will be able to understand the basic ethical theories discussing the ethics of good and bad patterns of character.	c,f,g
3.0	To make him reasonably a "good professional conscious of his duties to the society.	3.1	Students will be able to understand the basics regarding the code of ethics and get a balanced outlook on law.	f,g,h
4.0	To give an overview of sense of social responsibility and security.	4.1	Students will be able to implement the concepts in one's career for achieving excellent job satisfaction.	d,e,g,h
5.0	To make him aware of the global issues in professional ethics.	5.1	Students will be able to understand the global issues and get expertise and provide moral leadership.	b,d,f,i,l

UNIT I - HUMAN VALUES	**(8)**
Morals, Values and Ethics – Integrity, Work Ethic and Service Learning –Virtues – Respect for Others – Living Peacefully – Caring, Sharing and Honesty – Courage, Valuing Time and Co-operation – Commitment, Empathy and Self-Confidence – Challenges in the Work Place – Spirituality.	
UNIT II - ENGINEERING ETHICS	**(8)**
Senses of 'Engineering Ethics' - Variety of moral issues - Types of inquiry - Moral Dilemmas - Moral Autonomy – Moral Development - Consensus and Controversy – Profession – Self-Respect and Senses of Responsibility - Theories about Right action – Self –interest, customs and religion.	
UNIT III - ENGINEERING AS SOCIAL EXPERIMENTATION	**(9)**
Engineering as experimentation - Engineers as responsible experimenters - Codes of Ethics – Industrial Standards - A balanced outlook on law – Case Study: The challenger.	
UNIT IV - ENGINEER'S RESPONSIBILITY FOR SAFETY	**(10)**
Safety and risk - Assessment of safety and risk - Risk benefit analysis and reducing risk – Case Study: Three mile island and Chernobyl. Collegiality and Loyalty - Respect for Authority - Collective Bargaining - Confidentiality - Conflicts of Interest - Occupational crime - Human rights and Employee rights.	
UNIT V - GLOBAL ISSUES	**(10)**
Multinational corporations - Environmental ethics - Computer ethics - Engineers as managers - Consulting engineers - Engineers as expert witnesses and advisors - Moral leadership.	
	TOTAL (L: 45) = 45 PERIODS

REFERENCES:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 2006.
2. R. S. Naagarazan, "A textbook on Professional Ethics and Human Values", New Age International Publishers, New Delhi, 2006.
3. Charles B. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004.
4. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000.

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17CAX13 CLOUD COMPUTING				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To introduce the broad perceptive of cloud architecture and model.	1.1	Students will be able to identify the architecture, infrastructure and delivery models of cloud computing.	a,b,c,g
2.0	To understand the concept of developing of cloud Services.	2.1	Students will be able to choose the appropriate cloud player, Programming Models and approach.	a,b,c,i,j
3.0	To be familiar with the lead players in cloud.	3.1	Students will be able to compare the strengths and limitations of cloud computing.	b,d,e
4.0	To know different cloud programming models as per need.	4.1	Students will be able to design Cloud Services and Set a private cloud.	b,c,k,l
5.0	To provide knowledge on Cloud Storage and Sharing.	5.1	Students will be able to evaluate File Storage and Explore Sharing.	b,c,k,g

UNIT I - UNDERSTANDING CLOUD COMPUTING	**(7)**
Cloud Computing – History of Cloud Computing - Cloud Architecture – Cloud Storage – Need for Cloud Computing - Advantages and Disadvantages of Cloud Computing - Companies in the Cloud Today – Cloud Services.	
UNIT II - DEVELOPING CLOUD SERVICES	**(10)**
Web–Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.	
UNIT III - USING CLOUD SERVICES	**(10)**
Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – String and Sharing Files.	
UNIT IV - OUTSIDE THE CLOUD	**(9)**
Evaluating Web Mail Services – Evaluating Instant Messaging – Evaluating Web Conference Tools – Creating Groups on Social Networks – Evaluating on Line Groupware – Collaborating via Blogs and Wikis.	
UNIT V - STORING AND SHARING	**(9)**
Understanding Cloud Storage – Evaluating on Line File Storage – Exploring on Line Book Marking Services – Exploring on Line Photo Applications – Exploring Photo Sharing Communities – Controlling it with Web Based Desktops. Introduction to Cloud Databases – Hadoop - Case Study.	
TOTAL (L: 45) = 45 PERIODS	

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REFERENCES:

1. Michael Miller, "Cloud Computing", Pearson Education, New Delhi, 2009.
2. Kai Hwang, Geoffrey C Fox, Jack G.Dongarra, "Distributed and Cloud Computing, from Parallel Processing to the Internet of Things", Morgan Kautomann Publishers, 2012.

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17CAX14 BUSINESS INTELLIGENCE					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To impart knowledge in business intelligence.	1.1	Students will be able to know about various business intelligence architectures.	b,c,d,e	
2.0	To understand the various knowledge delivery concepts.	2.1	Students will be able to gain awareness in knowledge delivery.	b,d,e,f	
3.0	To provide knowledge in various Efficiency measures.	3.1	Students will be able to extract various business intelligence efficiency measures.	b,f,g,h	
4.0	To understand about various Business Intelligence Applications.	4.1	Students will be able to apply different business intelligence applications.	i,j,k,l	
5.0	To provide knowledge in Emerging Trends in Business Intelligence	5.1	Students will be able to know about future beyond Technology in business intelligence.	i,j,k,l	

UNIT I - BUSINESS INTELLIGENCE	(9)
Effective and timely decisions – Data, information and knowledge – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence – Understanding the field of business intelligence in a global world.	
UNIT II - KNOWLEDGE DELIVERY	**(9)**
Business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.	
UNIT III – EFFICIENCY	**(9)**
Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis.	
UNIT IV - BUSINESS INTELLIGENCE APPLICATIONS	**(9)**
Marketing models – Logistic and Production models – Challenges of Business Intelligence – Real time Business Intelligence – Case studies.	
UNIT V- FUTURE OF BUSINESS INTELLIGENCE	**(9)**
Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.	
	TOTAL (L:45)= 45 PERIODS

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REFERENCES:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", Pearson, 9th Edition, 2013.
2. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
3. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
4. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.

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17CAX15 ORGANIZATIONAL BEHAVIOR AND ENTREPRENEURSHIP				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To understand the human interactions in an organization.	1.1	Students will be able to human behavior within groups or organizations and how this behavior can be modeled through analysis.	a,b,e,g,h
2.0	To understand process of leading individuals as a group to achieve a common objective.	2.1	Students will be able to various leadership styles and the power to resist and manage.	a,b,e,f,g
3.0	To understand entrepreneurship.	3.1	Students will be able to understand process of entrepreneur to be as own boss.	a,b,e,f,g
4.0	To understand about importance of motivation	4.1	Students will be able to acquire knowledge about motivation through training, self-assessment and how to manage stress.	a,b,f,g,h
5.0	To understand about financing and accounting in business.	5.1	Students will be able to acquire knowledge about management of capital and tax details.	a,b,g,i,l

UNIT I - ORGANIZATIONAL BEHAVIOUR	(9)
Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models - Personality – types – Factors influencing personality - Misbehaviour –Types – Management Intervention – Motivation –Types – Effects on work behavior – Organization Structure –Groups in organizations – Team building.	

UNIT II - LEADERSHIP AND POWER	(9)
Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics - Organizational change – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change.	

UNIT III – ENTREPRENEURSHIP	(9)
Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur - Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Identifying and selecting a good business opportunity - Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.	

UNIT IV – MOTIVATION	(9)
Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self-Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.	

UNIT V - FINANCING AND ACCOUNTING	(9)
Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.	
	TOTAL (L:45)= 45 PERIODS

REFERENCES:

1. Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 15th Edition, 2013.
2. Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition, 2001.
3. S.S.Khanka, "Entrepreneurial Development", 2013.
4. DonaldKuratko, "Entrepreneurship – Theory, Process and Practice", Cengage Learning, 9th Edition, 2014.

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17CAX16 SOFTWARE TESTING				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To summarize the importance of software quality.	1.1	Students can know the importance of software testing to measure software quality.	a,b,c
2.0	To recognize the fundamentals of software testing.	2.1	Students will know about Software Testing methodologies.	a,b,d
3.0	To develop test cases using manual testing and to enable the learner to become a Software Tester.	3.1	Students will be able to design the test cases and to getting familiarity over testing tools.	b,d,g
4.0	To interpret with Unit testing tool.	4.1	Students can practice unit testing tool JUnit Testing Tool	g,j,k
5.0	To interpret with test management tool.	5.1	Students can practice test management tool Jira.	j,k,l

UNIT I – INTRODUCTION TO QUALITY AND SOFTWARE QUALITY	**(9)**
Introduction-Historical Perspective of Quality-Definition of Quality-Total Quality Management-Continuous Improvement Cycle-Constraints of Software Quality Assessment-Software Development Process-Types of Products-Software Quality Management-Software has defects-Processes Related to Software Quality-Quality Management System Structure-Important Aspects of Quality Management.	
UNIT II - FUNDAMENTALS OF SOFTWARE TESTING	**(9)**
Definition of Testing-Approaches to Testing-Testing during Development Life Cycle-Requirements Traceability Matrix-Essentials of Software Testing-Workbench-Important Features of Testing Process-Test Planning-Test Team Efficiency and Approach-Testing Process-Test Methodologies/Approaches-Skills Required by Tester.	
UNIT III- TESTING TYPES AND DOCUMENTS PREPARATION	**(9)**
Unit Testing- Integration Testing – System Testing – Interaction Testing – Verification and Validation – Use case-Test Case-Bug Report Preparation.	
UNIT IV – JUNIT TOOL	**(9)**
JUnit – Overview – Test Framework – Annotations – API – Assertion – Writing a Test – Executing test – Suite Test – Exceptions Test – Parameterized Test.	
UNIT V- TEST MANAGEMENT TOOL (JIRA)	**(9)**
Introduction to Test Management tool - JIRA - Agile Methodology -- Scrum – Test Scenario preparation – Test Case Design Techniques - Test Case Preparation – RTM Mapping – Test Case Execution – Defect Life Cycle -- Bug reporting – Bug Tracking.	
TOTAL (L:45)= 45 PERIODS	

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REFERENCES:

1. M.G. Limaye, "Software Testing, Principles Techniques and Tools", Tata McGraw Hill Education Private Limited, New Delhi, 2010.
2. Paul C. Jorgensen, "Software Testing, A Craftsman's Approach", CRC Press, Second Edition, 2007.
3. Java Code Geeks, "JUnit Programming Cookbook", Exelixis Media P.C., 2017. https://www.javacodegeeks.com/wp-content/uploads/2017/04/JUnit-Programming-Cookbook.pdf

URL:

Unit-IV

1. https://junit.org/junit5/docs/current/user-guide/#overview-getting-started-example-projects
2. https://www.tutorialspoint.com/junit/junit_writing_tests.htm
3. https://www.javacodegeeks.com/2014/11/junit-tutorial-unit-testing.html

Unit-V

1. https://artoftesting.com/software-testing-tutorial.html
2. https://www.tutorialspoint.com/jira/jira_overview.htm
3. https://confluence.atlassian.com/jirakb/using-jira-software-for-test-case-management-136872198.html

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17CAX17 CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

PREREQUISITE: 17CAB09

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	Understand the basic concept of Cryptography and Network Security, their mathematical models.	1.1	Students will be able to classify the symmetric encryption techniques	a,d,f
2.0	Learn the classical encryption techniques and concepts of finite fields and number theory.	2.1	Students will be able to gain knowledge various Public key cryptographic techniques.	a,c,j,l
3.0	Understand the message authentication and hash functions.	3.1	Evaluate the authentication and hash algorithms.	f,g,j
4.0	To impart knowledge on Network security	4.1	Summarize the intrusion detection and its solutions to overcome the attacks	f,g,j,l
5.0	Understand the basic concepts of system level security.	5.1	Basic concepts of system level security.	a,f,g,j

UNIT I - SYMMETRIC CIPHER	**(9)**
Overview – Classical Encryption Techniques - Block Ciphers and the Data Encryption Standard – Euclid"s Algorithm - Polynomial Arithmetic - Advanced Encryption Standard.	
UNIT II - PUBLIC - KEY ENCRYPTION	**(9)**
Introduction to Number Theory - Public Key Cryptography and RSA - Key Management: Diffie Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.	
UNIT III - HASH FUNCTIONS	**(9)**
Cryptographic Hash Functions – Message Authentication Codes: Message Authentication Requirements, Functions, Security of MACs, MACs based on Hash Functions and Block Ciphers – Digital Signatures.	
UNIT IV - NETWORK SECURITY PRACTICE	**(9)**
Network Access Control and Cloud Security - Wireless Network Security: Mobile Device Security, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security - Electronic Mail Security: Pretty Good Privacy, S/MIME - IP Security.	
UNIT V - SYSTEM SECURITY	**(9)**
Malicious Software: Types of Malicious Software, Propagation, Payload - Intruders: Intrusion Detection, Password Management – Firewalls: Need for Firewalls, Characteristics, Types, Firewall Basing, Location and Configuration.	
	TOTAL (L:45)= 45 PERIODS

REFERENCES:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Sixth Edition, Pearson Education, 2014.
2. Atul Kahate, "Cryptography and Network Security", Third Edition, Tata McGraw Hill Education (India) Private Limited, 2013.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger and Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, 2015.

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17CAX18 MOBILE COMPUTING					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To get knowledge in Wireless communication Fundamentals.	1.1	Students will be able to gain knowledge in Wireless communications.	a,b,c	
2.0	To understand the fundamentals of GSM & GPRS.	2.1	Students will be able to know about the working mechanism of GSM & GPRS.	d,e	
3.0	To provide knowledge about Wireless Networks.	3.1	Students will be able to extract knowledge in Wireless Networks.	a,e,f	
4.0	To understand about Network Layers.	4.1	Students will be able to apply knowledge in MANET Applications.	g,h,i	
5.0	To provide knowledge in Transport and Application Layers.	5.1	Students will be able to gain awareness in WAP Architecture.	j,k,l	

UNIT I - WIRELESS COMMUNICATION FUNDAMENTALS	(9)
Principles of Cellular Networks- Mobile Computing Applications - characteristics of Mobile computing - Overview of TDMA - CDMA - FDMA - 3G - TMT 2000, Overview of 4G.	
UNIT II - TELECOMMUNICATION SYSTEMS	**(9)**
GSM - Mobile Services - System Architecture - UMTS - Handover-Security - GPRS Architecture -Services.	
UNIT III - WIRELESS NETWORKS	**(9)**
Wireless LAN-Architecture-Types of Wireless LAN-IEEE 802.11 Architecture-Services- HIPERLAN-Bluetooth.	
UNIT IV - NETWORK LAYER	**(9)**
Mobile IP-Goals - Entities and Terminology- Agent Discovery – Registration - DHCP - Overview of DSDV & DSR - Mobile Ad-hoc Networks — MANET Applications.	
UNIT V - TRANSPORT AND APPLICATION LAYERS	**(9)**
Overview of Traditional TCP - Congestion Control - Slow Start - Fast Retransmit/Fast Recovery, Classical TCP improvements - Indirect TCP - Snooping TCP - WAP Architecture.	
TOTAL (L:45)= 45 PERIODS	

REFERENCES:

1. Jochen Schiller, "Mobile Communications", Second Edition (revised), Prentice Hall of India, Pearson Education, 2014.
2. Andreas F. Molisch,"Wireless Communications", Second Edition, Willy Publication, 2010.
3. B.S.Manoj, C.Siva Ram Murthy, "Adhoc Wireless Networks", Pearson Education, 2014.
4. Rappaport, "Wireless Communications: Principles and Practice", Pearson Education, India, 2009.
5. William Stallings, "Wireless Communications and Networks", Pearson Education, 2007.

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17CAX19 HEALTH CARE MANAGEMENT					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To understand the basic concepts of health care system.	1.1	Students will be able to understand basic healthcare information laws and standards.	a,b,d	
2.0	To ensure access of clinical information system.	2.1	Students will be able to know current and emerging clinical information system.	a,b,c,d	
3.0	To understand IT that supports health care information system.	3.1	Students will be able to design a suitable HIS architecture.	c,d,j,k	
4.0	To understand IT governance and assessment of health care information system.	4.1	Students will be able to use research methods and analysis together to plan the management of IT challenges.	c,i,j,k	
5.0	To understand about Information Technology initiatives.	5.1	Students will be able to use research methods and analysis together and do IT initiatives and Case Studies.	c,i,j,k,l	

UNIT I – INTRODUCTION	(9)
Introduction to Health Care Information – Health Care Data Quality – Health Care Information Regulations, Laws and Standards.	
UNIT II - HEALTH CARE INFORMATION SYSTEMS	**(9)**
History and evolution of health care information systems – Current and emerging use of clinical information systems– system acquisition – System implementation and support.	
UNIT III - INFORMATION TECHNOLOGY	**(9)**
Information architecture and technologies that support health care information systems – Health care information system standards – Security of health care information systems.	
UNIT IV - MANAGEMENT OF IT CHALLENGES	**(9)**
Organizing information technology services – IT alignment and strategic planning – IT governance and management.	
UNIT V- IT INITIATIVES	**(9)**
Management's role in major IT initiatives – Assessing and achieving value in health care information systems. Case study.	
	TOTAL (L:45)= 45 PERIODS

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REFERENCES:

1. Karen A Wager, Frances W. Lee, John P Glaser, "Health Care Information Systems: A Practical Approach for Health Care Management", Fourth Edition, John Wiley, 2017.
2. Charlotte Weaver, Marion J. Ball, George R.kim, Joan M.Kiel ,"Healthcare Information Management Systems: Cases, Strategies, and Solutions", Springer, Fourth Edition, 2015.
3. Rudi Van De Velde and Patrice Degoulet, "Clinical Information Sytems: A Componenet based approach", Springer 2006.
4. Kevin Beaver, Healthcare Information Systems, Second Edition Best Practices, CRC Press, 2002.
5. Marion J. Ball Healthcare Information Management Systems: A Practical Guide Springer-Verlag GmbH, 1995.

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17CAX20 TECHNICAL DOCUMENTATION				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To learn the needs for documentation.	1.1	Students will be able to write documentation of projects or products, so that readers can understand the documentation.	e,f,g,j
2.0	To learn in developing appropriate process steps and documentation.	2.1	Students will be able to develop appropriate process steps and documentation for effective and successful projects and products.	e,f,g,j
3.0	To provides guidelines to develop process and documentation tools that address the particular needs of organization.	3.1	Students will be able to develop process and use documentation tools.	e,f,g,j
4.0	To define strategy for developing a project or product.	4.1	Students will be able to plan disaster management and recovery.	e,f,g,j,l
5.0	To know about standards and templates.	5.1	Students will be able to know various standards and templates.	e,f,g,j,l

UNIT I – OVERVIEW	(9)
Introduction - Plan for Success - Elements of Process, Documentation Tools: Types of Documentation, Labeling, Other Documentation Tasks, Symbols, Cross-Referencing Documentation, Specifications.	
UNIT II - STYLE GUIDE AND MEETINGS	**(9)**
Definition of Document - General Structure of Documents: Page Layout, Standard Writing Practices, Image File Formats - Document Creation and Editing: Permissions, Citing References, Terms, Copyright, Trademark, and Legal Notices, Document Numbering, Maintaining Corporate Image Consistency - Corporate Identity – Reference Books. Organization - Responsibility of the Chairperson, Challenges of Working Remotely, Developing a Scope of Work and Work Plan, Decision Making, Leadership.	
UNIT III - SYSTEMS ENGINEERING	**(9)**
Systems Theory - Systems Engineering Process, Functional Analysis, Evaluation and Decision, Description of System Elements. Phases of a Typical System Design Project: Electronic System Design, Detailed Design, Budget Requirements Analysis, Feasibility Study and Technology Assessment. Program Management: Executive and Project Manager, System Engineer, Other Project Team Members.	
UNIT IV - CONCURRENT ENGINEERING, DISASTER PLANNING AND RECOVERY	**(9)**
Team Process - Process View of Production: QFD, DOE, Robust Design. Developing a Disaster Plan – Emergency Management: Planning Process, Managing Risk, Risk Assessment and Business Resumption Planning, Workplace Safety, Outside Plant Communication Links, Emergency Power and Batteries, Air Handling Systems, Water Hazards, Alternate Sites, Security, Managing Fear.	

UNIT V- STANDARDS, REFERENCE AND TEMPLATES	(9)
Standards Development Organization, Professional Society Engineering Committees, History of Modern Standards. Principal Standard Organizations: ISO, IEC, ITU, ANSI, Tabular Data, Final Thoughts.	
TOTAL (L:45)= 45 PERIODS	

REFERENCES:

1. Jerry C.Whitaker, Robert K. Mancini, "Technical Documentation and Process", CRC Press, Taylor & Francis Group, NewYork, 2013.
2. Kieran Morgan, "Technical Writing Process", Lightning Source Inc, First Edition, 2015.
3. Thomas T. Barker, "Writing Software Documentation – A Task-Oriented Approach", Pearson Education, Second Edition, 2003.

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17CAX21 DATABASE ADMINISTRATION					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB08					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To understand the fundamentals of Database.	1.1	Students will be able to practice in Database Architecture.	a,b,d
2.0	To provide an idea for Managing tablespace and Storage Management.	2.1	Students will be able to gain knowledge in Storage Management.	d,h,i
3.0	To provide knowledge in Database Management And Monitoring Space.	3.1	Students will be able to extract knowledge in Data Dictionary.	h,i,j
4.0	To understand about Managing Transactions And Database Tuning.	4.1	Students will be able to apply Database Tuning and Managing Transactions.	j,k,l
5.0	To provide knowledge in Database security, Backup and Recovery.	5.1	Students will be able to gain awareness about Recovery and Security methods in DB Administration.	c,k,l

UNIT I - INTRODUCTION OF DATABASE ARCHITECTURE	(9)
An Overview of Databases and Instances-Logical Storage Structures-Logical Database Structures-Physical Storage Structures-Multiplexing Database Files- Memory Structures-Overview of Backup/Recovery-Security Capabilities-Real Application Clusters-Software Installation- DBA types –Database Design.	
UNIT II - MANAGING TABLESPACES AND STORAGE MANAGEMENT	**(9)**
Planning and Managing Tablespaces: Tablespace Architecture-Installation Tablespaces-Segment Segregation-Physical Database Layouts and Storage Management: Traditional Disk Space Storage- Automatic Storage Management.	
UNIT III - DATABASE MANAGEMENT AND MONITORING SPACE	**(9)**
Resource Management and Stored Outlines-Supporting Tables Based on Abstract Datatypes-Quiescing and Suspending the Database-Supporting Iterative Development-Managing Package Development-Common Space Management Problems-Segments, Extents and Blocks-Data Dictionary and Dynamic Performance Views-Space Management Methodologies-Built-in Space Management Tools-Space Management Scripts.	
UNIT IV - MANAGING TRANSACTIONS AND DATABASE TUNING	**(9)**
Basics of Transaction-Undo Basics-Managing Undo Tablespaces-Flashback Features-Tuning Application Design-Tuning SQL-Tuning Memory Usage-Tuning Data Access-Tuning Data Manipulation-Tuning Physical Storage-Reducing Network Traffic-Using STATSPACK and the Automatic Workload Repository - Database Availability.	
UNIT V - DATABASE SECURITY,AUDITING,RAC,BACKUP AND RECOVERY	**(9)**
Using STATSPACK-Database Authentication-Database Authorization-Auditing-Data Encryption Techniques-RAC Database Characteristics-RAC Maintenance-Logical Backups-Physical Backups-Using Data Pump Export and Import-RMAN Features and Components-Overview of RMAN Commands and Options-Backup Operations-Recovery Operations.	
	TOTAL (L:45)= 45 PERIODS

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REFERENCES:

1. Kevin Loney, Bob Bryla "Database Administration", Tata McGraw Hill, New Delhi, 2011.
2. Craig S.Mullins, "Database Administration", Pearson Education, Second Edition, 2013.

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17CAX22 SOCIAL NETWORK ANALYSIS					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To understand about semantic web and related applications.	1.1	Students will be able to proceed with various Applications of Social Network	a,b,c,d	
2.0	To understand about knowledge representation using ontology.	2.1	Students will be able to gain awareness about ontology and their in semantic web.	d,e,f,g	
3.0	To provide knowledge in extracting and mining communities in web social networks.	3.1	Students will be able to know about various communities of in social networks.	a,f,g	
4.0	To understand human behavior in social web and related communities.	4.1	Students will be able to know about Understanding and predicting human behavior for social communities.	f,g,h,i	
5.0	To provide knowledge in visualization of social networks.	5.1	Students will be able to understand various applications of social networks.	j,k,l	

UNIT I – INTRODUCTION	(9)
Introduction to Semantic Web: Limitations of current Web – Development of Semantic web – Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web based networks – Applications of Social Network Analysis- Case Study.	
UNIT II - MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION	**(9)**
Ontology and their role in the Semantic Web: Ontology based knowledge Representation – Ontology languages for the Semantic Web: Resource Description Framework – Web Ontology Language – Modeling and aggregating social network data: State-of-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations – Case Study.	
UNIT III - EXTRACTING AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS	**(9)**
Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities.	
UNIT IV - PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES	**(9)**
Understanding and predicting human behavior for social communities – User data management - Inference and Distribution – Enabling new human experiences – Reality mining – Context – Awareness – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis.	
UNIT V- VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS	**(9)**
Graph theory – Centrality – Clustering – Node – Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix – based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co-Citation networks – Facebook – Twitter – Linkedin.	
	TOTAL (L:45)= 45 PERIODS

REFERENCES:

1. Peter Mika, "Social Networks and the Semantic Web", Springer, First Edition, 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, First Edition, 2010.
3. Stephen P Borgatti, Martin G Everett, Jeffrey C Johnson "Analyzing Social Networks", Sage, Second Edition, 2018.
4. Easley and Kleinberg, Networks, Crowds, and Markets "Reasoning about a highly connected world", Cambridge Univ. Press, 2010.

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17CAX23 OBJECT ORIENTED ANALYSIS AND DESIGN				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To provide a brief, hands-on overview of object-oriented analysis in software process.	1.1	Students will be able to identify state & behavior of real world objects.	a,b,c
2.0	To develop object-oriented models and identify implementation strategies.	2.1	Students will be able to understand various object oriented methodologies and choose the appropriate one for solving the problem with the help of various case studies.	a,b,c
3.0	To demonstrate and apply basic object oriented techniques to object oriented analysis.	3.1	Students will be able to understand the concept of analysis and identify object, relationships, attributes, methods.	b,d,j
4.0	To understand and apply design process and techniques for object oriented software.	4.1	Students will be able to implement design in developing a software project.	b,c,i,k,l
5.0	To discuss object relational systems and quality assurance.	5.1	Students will be able to understand importance of quality assurance and testing strategies.	b,i,j,k,l

UNIT I – INTRODUCTION	**(9)**
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.	
UNIT II - METHODOLOGY AND UML	**(9)**
Introduction – Survey – Rumbugh, Booch, Jacobson methods – Patterns – Frameworks – Unified approach – Unified modelling language – Static and Dynamic models – UML diagrams – Dynamic modeling – Model organization – Extensibility.	
UNIT III - OBJECT ORIENTED ANALYSIS	**(9)**
Identifying Usecase – 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.	
UNIT IV - OBJECT ORIENTED DESIGN	**(9)**
Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability.	
UNIT V - DATABASES AND QUALITY ASSURANCE	**(9)**
Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface. Quality assurance – Testing strategies – Test cases – Automated Testing Tools.	
	TOTAL (L:45)= 45 PERIODS

REFERENCES:

1. Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition, 2008.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Addison Wesley Longman, Second Edition, 2004.
3. Craig Larman, "Applying UML and Patterns", Pearson Education, Third Edition, 2005.
4. https://artoftesting.com/software-testing-tutorial.html (Unit-V)

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17CAX24 ADVANCED DATABASE MANAGEMENT SYSTEMS					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB08					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To impart knowledge in Transaction Processing and Concurrency Control.	1.1	Students will be able to proceed transaction properties, concurrency control techniques and Deadlock handling.	a,b,j
2.0	To understand the various Databases, its security issues and recovery	2.1	Students will be able to gain awareness about Recovery and Security methods in Database.	d,k,l
3.0	To provide knowledge in objects and XML Models.	3.1	Students will be able to extract XML Documents from Relational Databases.	b,j,k,l
4.0	To understand about Distributed Database and its current trends.	4.1	Students will be able to apply a various Current Trends in Distributed Databases	g,h,i
5.0	To provide knowledge in Enhanced Data Models for Advanced Applications	5.1	Students will be able to understand various types of advanced database concepts such as Spatial database, Multimedia database.	j,k,l

UNIT I - TRANSACTION PROCESSING AND CONCURRENCY CONTROL	**(9)**
Introduction to Transaction Processing - Transaction and System Concepts - Desirable properties of Transaction - Characterizing Schedules based on Recoverability and Serializability. Concurrency Control Techniques: Two-Phase Locking Techniques - Concurrency Control based on Timestamp Ordering – Deadlock Handling & Recovery.	
UNIT II - RECOVERY AND SECURITY	**(9)**
Recovery concepts- Recovery Techniques: Deferred update – Immediate update – shadow paging. Introduction to database security issues- Discretionary Access Control based on Granting and Revoking privileges- Mandatory Access Control and Role-based Access Control for Multilevel security - kinds of failures.	
UNIT III - OBJECT AND XML MODELS	**(9)**
Overview of Object-Oriented concepts- Object Identity, object structure and type constructors- Encapsulation of operations, methods and persistence- Type and class Hierarchies and Inheritance – Complex Objects. XML: Structured, Semi-structured, and Unstructured Data -XML Hierarchical (Tree) Data Model -XML Documents, DTD, and XML Schema - Storing and Extracting XML Documents from Databases - XML Languages -Extracting XML Documents from Relational Databases.	
UNIT IV - DISTRIBUTED DATABASES	**(9)**
Distributed Database Concepts - Types of Distributed Database Systems -Distributed Database Architectures - Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design - Query Processing and Optimization in Distributed Databases -Overview of Transaction Management in Distributed Databases -Overview of Concurrency Control and Recovery in Distributed Databases -Distributed Catalog Management -Current Trends in Distributed Databases – Reliability.	
UNIT V- ENHANCED DATA MODELS FOR ADVANCED APPLICATIONS	**(9)**
Active Database Concepts and Triggers -Temporal Database Concepts - Spatial Database Concepts -Multimedia Database Concepts -Introduction to Deductive Databases.	
	TOTAL (L:45)= 45 PERIODS

REFERENCES:

1. R. Elmasri, S.V. Navathe, "Fundamentals of Database Systems", Pearson Education, Sixth Edition, 2013.
2. Henry F. Korth, Abraham Silberschatz, S. Sudarshan," Database System Concepts", McGraw-Hill International Publications, Sixth Edition, 2010.
3. Date C.J., "An Introduction to Database Systems", Addison-Wesley, Eighth Edition, 2004.
4. Raghu Ramakrishnan, "Database Management Systems", McGraw Hill Education, Third Edition, 2003.

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17CAX25 WEB SERVER ADMINISTRATION				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To provide understandability about basics of server environments.	1.1	Students will be able to know about web environment, server environment and network details.	a,b,e,g
2.0	To provide knowledge about installation and configuring details about servers.	2.1	Students will be able to know about server, hardware details, file system selection, configuration of TCP/IP in Windows and Linux and configuration of DNS in Windows and Linux.	a,b,e,g,k
3.0	To provide knowledge about how to manage server.	3.1	Students will be able to gain knowledge about managing users and groups, managing file system permissions and the details about websites in IIS, Apache servers.	a,b,e,g,k
4.0	To understand about extended web environment services.	4.1	Students will be able to gain understandability in email services, FTP services and Telnet and terminal services.	a,b,e,g,k
5.0	To gain knowledge about how to secure and monitor web environment.	5.1	Students will be able to gain knowledge about threats, how to secure data transmission, server applications and analysis about tools for web servers.	a,b,e,g,k

UNIT I - INTRODUCTION AND BASICS	(9)
Web environment - Server Environment - OSI Model - TCP/IP Model - Bandwidth and Throughput - Web Hosting Solutions - File servers - Application Servers - Server components - Disaster assessment and recovery - Network Components - Setting up IP Addressing.	

UNIT II - SETTINGS UP SERVER	(9)
Single-Boot and Multi-Boot Systems - Checking Hardware Compatibility - Naming Computers - Identifying Devices - Selecting a File System - Installing Microsoft Windows Server - Installing Red Hat Linux - An Introduction to Linux Commands - Configuring TCP/IP in Windows and Linux - Domain Name Service (DNS) - Components of DNS - Configuring DNS in Linux and Windows.	

UNIT III - MANAGING A SERVER	(9)
Managing Users and Groups - Managing Files System Permissions - Features of HTTP - Installing Web Server - Apache Web Server - Internet Information Services (IIS) - Hosting Multiple Web Sites - IIS Properties - Apache Properties - New Web Sites in IIS - New Web Sites (Virtual Hosts) in Apache - Virtual Directories.	

UNIT IV - EXTENDING THE WEB ENVIRONMENT	(9)
Email Environment - Role of DNS in Email - Email protocols - Microsoft Exchange Architecture - Web-based Email clients - FTP Services - NEWS Server - Remote Access to a Server - Telnet and Terminal services - Streaming Media Servers - E-commerce Servers.	

UNIT V- SECURING AND MONITORING WEB ENVIRONMENT	(9)
Threats and Vulnerabilities - Securing Data Transmission - Securing Server Applications - Authenticating Web Users - Firewall - Proxy Server - Intrusion Detection Software - Monitoring Web Server Applications - Monitoring DNS, Email applications and FTP - Analysis tools for Web Servers.	
	TOTAL (L:45)= 45 PERIODS

REFERENCES:

1. Steve Silva, "Web Server Administration", Cengage Learning, 2007
2. Ken Schaefer et al., "Professional Microsoft IIS 8", Wrox Publications, 2013.
3. Ken Coar and Rick Bowen, "Apache Cookbook", Second Edition, 2012.

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17CAX26 COMPILER DESIGN					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	Learn the design principles of a Compiler	1.1	The students will be able to apply the knowledge of lex tool &yacc tool to develop a scanner & parser..	a,b,e	
2.0	To understand the complier construction tools.	2.1	The students will be able to design experiments for Intermediate Code Generation in compiler	c,g,j	
3.0	To understand, design and implement the different parsing techniques.	3.1	The students will be able to design a software system for backend of the compiler	b,c,j	
4.0	To learn and design intermediate code generation schemes and run time environment	4.1	The students will be able to learn how to optimize and effectively generate machine codes	a,d,g	
5.0	To learn how to optimize and effectively generate machine codes.	5.1	The students will be able to analyze the storage allocation strategies in run time environment.	b,g,i	

UNIT I – INTRODUCTION TO COMPILER	(9)
Translators - Compilation and Interpretation - Language processors - Introduction to compiling – Analysis of the source program –The phases of a compiler – Cousins of a compiler – The grouping of phases - compiler writing tools – bootstrapping.	
UNIT II - LEXICAL ANALYSIS SYNTAX ANALYSIS	**(9)**
The role of the lexical analyzer – Input buffering – Specification and Recognition of tokens – Finite Automata – Conversion of NFA to DFA - Construction of NFA from Regular Expression. Role of the parser –Writing Grammars – Context-Free Grammars.	
UNIT III - TOP DOWN & BOTTOM UP PARSING	**(9)**
Top down parsing– Recursive descent parsing, Predictive parsing – LL(1) Grammars. Bottom up parsing – LR parsers – Construction of a simple SLR, CLR and LALR parsing table.	
UNIT IV - INTERMEDIATE CODE GENERATION AND RUN TIME ENVIROMENT	**(9)**
Intermediate languages – Declarations – Assignment statements – Boolean expressions – Case statements – Back patching – Procedure calls. Run - Time Environments – Source language issues – Storage- allocation strategies.	
UNIT V - CODE GENERATION AND CODE OPTIMIZATION	**(9)**
Issues in the design of a code generator – The Target machine – Run time storage management – Register allocation and assignment – The DAG representation of basic blocks – The Principle sources of Optimization – Peephole Optimization – Optimization of basic blocks.	
	TOTAL (L: 45) = 45 PERIODS

REFERENCES:

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, "Compilers – Principles, Techniques, and Tools", Pearson Education Asia, 2013.
2. Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, 2003.
3. C. N. Fisher and R. J. LeBlanc "Crafting a Compiler with C", Pearson Education, 2011.
4. SudhaSadasivam G, "Compiler Design", Scitech Publications (India) Private Limited, Chennai, 2010
5. Dhamdhere D M, "Compiler Construction Principles & Practice", Macmillan India Limited, New Delhi, 1997. Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, 2011.

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17CAX27 DISTRIBUTED COMPUTING					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB07, 17CAB09					
COURSE OBJECTIVES AND OUTCOMES:					

Course Objectives		Course Outcomes		Related Programme Outcomes
1.0	To learn the principles of a Distributed Computing	1.1	Students will be able to familiar about basics of Distributed computing, Distributed Operating System and Message Passing	a,c
2.0	To learn about Remote Procedure Call.	2.1	Students will be able to implement RPC Mechanism.	a,b,c
3.0	To understand Distributed Shared Memory	3.1	Students will be able to familiar design and implementation of DSM	a,c,l
4.0	To familiar about resource and process management	4.1	Students will be able to explore various approaches of resource and process management	a,c,l
5.0	To familiar distributed file systems and naming.	5.1	Students will be able to know how to access files located in different locations and naming convention.	a,c,l

UNIT I – INTRODUCTION AND MESSAGE PASSING	(9)
Fundamentals: Distributed computing, System Model, Distributed Operating System, Designing Operating System, Introduction to DCE. Message Passing: Desirable Features Message Passing System, Issues in Message Passing, Synchronization, Buffering, Multi-Datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.	
UNIT II - REMOTE PROCEDURE CALL	**(9)**
Remote Procedure Call: RPC model, Transparency of RPC, implementing RPC mechanism, Stub generation, Marshaling arguments and Results, Server Management, Parameter-passing Semantics, call Semantics, Communication protocols for RPCs, Complicated RPC Client server binding, Exception Handling, Security, special types of RPCs, RPCs in Heterogeneous Environments, Lightweight RPC, Optimizations for better performance.	
UNIT III - DISTRIBUTED SHARED MEMORY	**(9)**
Distributed Shared Memory: General architecture of DSM systems, Design and implementation of DSM, Granularity, structure of shared memory space, consistency models, Replacement Strategy, Thrashing, other approaches to DSM, Heterogeneous DSM, and Advantages of DSM.	
UNIT IV – SYNCHRONIZATION, RESOURCE AND PROCESS MANAGEMENT	**(9)**
Synchronization: Clock Synchronization, Event Ordering, Mutual Exclusion, Deadlock, Election Algorithm. Resource and Process Management : Desirable Features of Global Scheduling Algorithm, Task Assignment Approach, Load Balancing Approach, Load Sharing Approach, Introduction to Process Management, Process Migration, Threads.	
UNIT V - DISTRIBUTED FILE SYSTEMS AND NAMING	**(9)**
Distributed File Systems: Introduction, Good Features of DFS, File Models, File Accessing Models, File Sharing Semantics, File-Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles. Naming: Introduction, Desirable features of Naming System, Fundamental Concepts, System Oriented Names, Object Locating Mechanisms, Human Oriented Names, Name Caches and Naming and Security.	
	TOTAL (L: 45) = 45 PERIODS

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REFERENCES:

1. Pradeep K Sinha " Distributed Operating Systems : Concepts and design" IEEE Computer Society Press.
2. A. Tanuenbaum "Distributed Operating System" Pearson Edition.
3. Puder, Romer "Distributed Systems Architecture : Middleware approach" Elsevier Publication.
4. G. Coulouris, J. Dollimore and T. Kindberg "Distributed Systems : Concepts and design" Pearson Edition.
5. M. Singhal, N. Shivaratri " Advanced Concepts in Operating Systems" TMH.

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OPEN ELECTIVE (OE)

17CAO01 EMPLOYABILITY ENHANCEMENT AND ANALYTICAL SKILLS
(Common to 17EYZ04)

L	T	P	C
0	0	6	3

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To enable learners to achieve linguistic competence in oral and written discourse efficiently.	1.1	Write in an effective manner that demonstrates an understanding of the basic concepts of grammar.	f,i,j,l
2.0	To acquire necessary listening and speaking skills in order to comprehend discourse and to express effectively and exchange ideas.	2.1	Listen and comprehend lectures and communicate effectively in their area of Specialization and speak fluently.	f,i,j,l
3.0	To learn various active reading and writing strategies in order to comprehend, analyze and communicate ideas.	3.1	Read different genres of texts, infer implied meanings and write effectively for a variety of professional and social settings.	f,i,j,l
4.0	To develop students to workout solution for problems that involves mathematical aptitude.	4.1	Solve aptitude problems with ease.	f,i,j,l
5.0	To develop students to workout solutions for problems that involves general reasoning.	5.1	Solve reasoning problems with ease.	f,i,j,l

UNIT I – GRAMMAR	**(18)**
Parts of Speech – Synonyms & Antonyms - Primary Auxiliary Verbs – Modal Auxiliary Verbs - Tenses – Articles– Preposition – Conjunction–Common Errors - Subject Verb Agreement – Error Spotting – One word Substitution – Jumbled Sentences – Confusable word – Idioms and Phrases – Degrees of Comparison – Sentence Completion.	
UNIT II - LISTENING AND SPEAKING	**(18)**
LISTENING - Listening Strategies - Listening for Specific Information- Listening to TED & INK Talks - Listening for Signpost Language - Listening to Telephonic Conversations. SPEAKING - Group/Pair Presentations - Visume - Interview Skills – GD.	
UNIT III - READING AND WRITING	**(18)**
READING - Strategies for Effective Reading - Reading for Specific Information - Speed Reading Techniques - Critical Reading. WRITING - Job Application Letter with Resume - E-mail Writing - Paragraph Writing.	
UNIT IV – APTITUDE	**(18)**
Number System- Ratio & Proportion-Percentages-Averages-Profit & Loss.	
UNIT V – REASONING	**(18)**
Figure Series-Blood Relation-Analogy-Coding and Decoding-Odd one out.	
TOTAL (L: 0; P:90) = 90 PERIODS	

REFERENCES:

1. Tickoo, M. L., A. E. & Subramaniam, P. R.,"Intermediate Grammar Usage & Composition" Orient Blackswan, 1976.
2. Davis, Jason and Liss, Rhonda, "Effective Academic Writing (Level 3)" Oxford University Press, 2006.
3. Koneru, Aruna, "English Language Skills" Tata McGraw-Hill Education, 2011.
4. Raman, Meenakshi and Sharma, Sangeeta, "Technical Communication English Skills for Engineers" Oxford University Press, 2008.
5. Khattar, Dinesh, "Quantitative Aptitude", 3rd ed. New Delhi: Pearson, 2014.
6. Aggarwal R.S., "A Modern Approach to Verbal & Non Verbal Reasoning", Revised Edition, New Delhi: S.Chand Publishers, 2017.

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17CAE06 PROJECT WORK					
		L	T	P	C
		0	0	24	12
PREREQUISITE: 17CAE05					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		**Course Outcomes**		**Related Programme Outcomes**	
1.0	To learn to plan, analyze, design and implement software project.	**1.1**	Students will be able to acquire knowledge by applying various techniques in plan, analyze, design and implement software project.	**a,b,c,i,k**	
2.0	To understand software engineering principles and develop an ability to apply them to software design of real life problems in an industry/commercial environment.	**2.1**	Students will be able to apply engineering principles such cost estimation and time estimation for project.	**a,b,i,k,l**	
3.0	To learn to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.	**3.1**	Students will be able to get motivated to work as a team and to focus on getting a working project done on time with each student being held accountable for their part of the project.	**d,f,g,h**	
4.0	To learn about communication.	**4.1**	Students will be able to demonstrate the ability to communicate effectively in speech.	**e,f,g**	
5.0	To learn about professional ethics.	**5.1**	Students will be able to demonstrate professional ethics while working within team.	**e,f,g**	
6.0	To understand programming language concepts	**6.1**	Students will be able to apply programming language concepts for the project development.	**a,b,c,i,k,l**	
7.0	To learn about different software development process models and how to choose an appropriate one for a project.		Students will be able to choose from various software development process models appropriate for project.	**a,b,c,i,k,l**	
8.0	To learn about methods of documenting a project.		Students will be able to demonstrate the ability in writing the project details in document.	**a,b,c,i,j,k,l**	

TOTAL (P:24x15)= 360 PERIODS

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17CAX29 DATA SCIENCE TECHNIQUES (Common to 17RAX31 & 17ITX27 Courses)				
L	T	P	C	
3	0	0	3	

PREREQUISITE: NIL

COURSE OBJECTIVES AND OUTCOMES:

	Course Objectives		Course Outcomes	Related Programme Outcomes
1.0	To Understand Data Science concepts and formulate the problems.	1.1	Students will be able to use metrics to analyze the predications for the problem.	a, b, c
2.0	To make the students to know how to handle the data.	2.1	Students will be able to extract the data using tools like SSIS, RPA.	a, b, c, k
3.0	To make the students understand how to explore the data.	3.1	Students will be able to explore and analyze the data.	b, c, j, k
4.0	To make the students to know about Machine Learning and IPython.	4.1	Students will be able to code IPython for manipulating data.	b, c, j, k
5.0	To apply visualization techniques to clearly communicate analytic insights to business sponsors, analytic audiences and use Tabluea.	5.1	Students will be able to apply tool like Tableau to visualize data.	b, c, j, k

UNIT I – INTRODUCTION	**(9)**
Introduction to Data Science – Need of Data Engineer - Basic Statistics - Data Types - Problem Definition – Classification - Regression: Linear and Logistics - Metrics to analyze the Prediction: Confusion matrix, Least Square, R^2.	
UNIT II - DATA HANDLING	**(9)**
Different Tools used to extract data from client server: SSIS, RPA - Sample server and domain information to get started with tools - Data Preparation: SQL, Python – Testing.	
UNIT III - DATA ANALYSIS	**(9)**
Exploratory Data Analysis - Exercises for EDA - Insights and Testing.	
UNIT IV - MACHINE LEARNING AND BIG DATA ANALYTICS	**(9)**
Introduction to ML – Python - Programming with IPython – Arrays - Data Frame – Grouping – Merging, Joining, Concatenate – Input and Output - Working with the Data – Testing - Analytics with Data Robot - Machine learning Tool.	
UNIT V – VISUALIZATION	**(9)**
Introduction to visualization Tools – Tabluea, Power BI, Kibana - Working with Tabluea – Import the data – Options – filtering – Calculative Field – Geographic representation – Graph – Histogram, Scatter plot, Gain chart – Workbook – Creating Story.	
	TOTAL (L: 45) = 45 PERIODS

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1. Thomas. A. Runkler, "Data Analytics: Models and algorithms for Intelligent Data Analysis", Springer, Germany, 2012.
2. Suresh Kumar Mukhiya, Usman Ahmed, "Hands-On Exploratory Data Analysis with Python", Packt Publishing Ltd., UK, 2020.
3. Jared Dean, "Big Data, Data Mining and Machine Learning", Wiley Publication, 2014.

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1. https://www.tutorialspoint.com/machine_learning_with_python/machine_learning_with_python_jupyter_notebook.htm
2. https://www.tutorialspoint.com/tableau/index.htm

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17CAW04 DATA SCIENCE TECHNIQUES LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To understand basics statistical functions.	1.1	Students will be able to manipulate data using statistical functions.	a, b, c	
2.0	To learn about linear and logistic regression.	2.1	Students will be able to decide on the type of regression for the given problem.	a, b, c, k	
3.0	To learn how to work with data.	3.1	Students will be able to access / import, export and analyze the data.	b, c, j, k	
4.0	To learn to code using IPython.	4.1	Students will be able to implement arrays and data frame in IPython.	b, c, j, k	
5.0	To work with Tableau tool.	5.1	Students will be able to cleanse, analyze and visualize the data.	b, c, j, k	

LIST OF EXPERIMENTS

1. Basic Statistics
2. Linear Regression
3. Logistic Regression
4. Accessing / Importing and Exporting Data
5. Exploratory Data Analysis
6. Program using Array
7. Program using Data Frame
8. Data Manipulating / Cleansing using Tableau
9. Data Analysis / Visualization Tableau

TOTAL (P:60) = 60 PERIODS

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