



NANDHA ENGINEERING COLLEGE

(Autonomous)

Affiliated to Anna University Chennai + Approved by AICTE + Accredited by NBA-NewDelhi

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1.1.2 Details of Courses where syllabus revision was carried out in

MCA - Master of Computer Applications

Course Code	Course Name	% of Change
17CAB06	Data Structures	30
17CAE01	Functional English - I	67
17CAB05	Computer Architecture and Organization	20
17CAB10	Analysis of Algorithm and Design	25
17CAP06	Analysis of Algorithm and Design Laboratory	55
17CAE02	Functional English - II	67
17CAX01	Object Oriented Programming in Java - I	50
17CAX13	Cloud Computing	50
17CAB14	Big Data Analytics	20
17CAX16	Software Testing	40
17CAX11	Internet of Things and its Applications	85
Average		42.42 %



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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



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	17CA001	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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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.



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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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,i	
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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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	

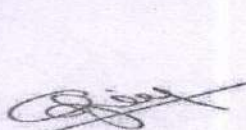


17CAP06 ANALYSIS OF ALGORITHM AND DESIGN LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn programming constructs.	1.1	Students will be able to apply generic programming technique 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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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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PROFESSIONAL ELECTIVES (PE) –EMBEDDED COURSE (E1& E2)

17CA01 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			

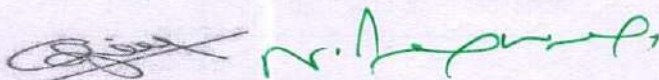
UNIT I - FUNDAMENTALS OF JAVA PROGRAMMING	(6)
Introduction – Features – Applications – Data types – Key words – Scope – Type casting – Arrays – Operators – Control Statements – Command Line Arguments- Lambda Expressions.	
UNIT II - CLASSES and OBJECTS	(6)
Class – Object – Methods – Constructors – Overloading 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:	
<ol style="list-style-type: none"> 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. 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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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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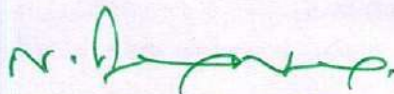
17CAB14 BIG DATA ANALYTICS					
		L	T	P	C
		3	0	0	3
PREREQUISITE: 17CAB11					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To learn tips and tricks for Big Data use cases and solutions..	1.1	Students will get knowledge about the basic terminology 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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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



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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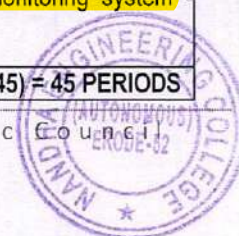
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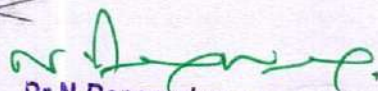
17CAX11 INTERNET OF THINGS AND ITS APPLICATIONS (Common to 17ECX16)					
		L	T	P	C
		3	0	0	3
PREREQUISITE: NIL					
COURSE OBJECTIVES AND OUTCOMES:					
Course Objectives		Course Outcomes		Related Programme Outcomes	
1.0	To make the students to know about basics of Electrical and Electronic devices.	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 Madiseti, "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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