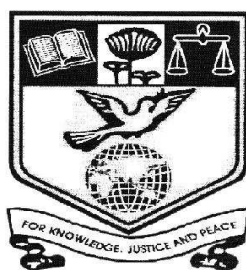# Curriculum Framework and Syllabi for

Master of Computer Applications (MCA)

2 Years Course

(For the candidates to be admitted from the academic year 2021-2022)

(UNDER CHOICE BASED CREDIT SYSTEM-CBCS)

POST GRADUATE AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

NEHRU MEMORIAL COLLEGE (AUTONOMOUS)

[Nationally Accredited with 'A' Grade by NAAC]

Affiliated to Bharathidasan University

Puthanampatti—621 007

PRELUDE

The Department of Computer Science was elevated as a Post Graduate Department in the year 1993 by introducing Master of Computer Applications. The Department is one of the pioneer institutions inculcating knowledge in the domain of computer applications and sculpting software professionals to suite the global needs in the IT industry. True to this fact our Alumni are working in various parts of the globe. The MCA Degree Programme offered by us provides a wider platform to the students hauling from rural, downtrodden society to climb up in the ladder of success.

VISION

Sculpting highly competent software professionals, researchers, innovators and entrepreneurs to cater the global needs of the society.

MISSION

- To offer high quality, value based higher education in Computer Applications
- To inculcate creative and innovative ideas among the mindset of the students
- To facilitate better communication skills and enhancing the personality of the students to meet the ever changing needs of the society
- To bridge the gap between the industry and institution by introducing latest technology in the field of computer science

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Post Graduates of MCA Programme will be able to

PEO1: Design, model and develop smart applications by utilizing strong technical and domain knowledge acquired from the programme for the improvement of society.

PEO2: Apply tools, technologies and critical thinking to develop applications for solving industry oriented problems

PEO3: Function as a team member and develop projects in a multi-disciplinary environment by emulating leadership skills.

PEO4: Work productively as computer professional by adopting to environment with lifelong learning and adhering to ethical standards.

PROGRAMME OUTCOMES (PO)

At the end of the MCA programme, the students will be able to

PO1: **Scientific Knowledge**
Apply the knowledge in mathematics, statistics and computer science to solve the real life problems.

PO2: **Problem Analysis**
Ability to analyze and design applications by solving problems in the field of computer science.

PO3: **Design and Development of Solution**
Design applications for any specific needs from societal and environmental aspects.

PO4: **Conduct investigations of complex problems**
Investigate and apply technical skills to solve complex problems.

PO5: **Modern tool usage**
Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to obtain solutions .

PO6: **Communication**

Communicate effectively and present technical information both in oral and written form.

PO7: **Individual and team work**

Function competently as an individual and as a leader in a team project

PO8: **Link with society& Ethics**

Work in professional environment by adhering professional ethics and involved in perennial learning in the context of social, economic and cultural aspects.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1: Apply the scientific Knowledge acquired to develop smart Applications.

PSO 2: Ability to design and develop software with appropriate documentation.

PSO 3: Apply Current tools and techniques to design and develop innovative Applications.

PSO 4: Understand the concepts in the specified domain and ability to apply it in real life problems.

NEHRU MEMORIAL COLLEGE [AUTONOMOUS[							
MASTER OF COMPUTER APPLICATIONS							
STRUCTURE 2021 -2022							
SEM	**COU**	**TITLE**	**HRS**	**CRE**	**INT**	**EXT**	**TOT**
I	21MCA101	CC-I-Python Programming	5	4	25	75	100
	21MCA102	CC-II- Data Structures and Algorithms	5	4	25	75	100
	21MCA103	CC-III-Operating System	4	4	25	75	100
	21MCA104	CC-IV-Computer system architecture	4	4	25	75	100
	21MCA105M	CC-V- Mathematics for Computer Applications	4	4	25	75	100
	21MCA106L	CC-VI- Python Programming Lab					
	21MCA107L	CC-VII- Data Structures Lab(using C)	3	2	40	60	100
	21MCA1SS	Soft Skill	2	2	100		100
	TOTAL		**30**	**26**			**700**
II	21MCA208	CC-VIII-Distributed Programming using J2EE	5	4	25	75	100
	21MCA209	CC-IX- Data Base Design	5	4	25	75	100
	21MCA210	CC-X-Software Engineering	4	4	25	75	100
	21MCA211	CC-XI-Cryptography and Network Security	4	4	25	75	100
	21MCA212L	CC-XII-J2EE Lab	3	2	40	60	100
	21MCA213L	CC-XIII- RDBMS Lab	3	2	40	60	100
	21MCA214Oa	OEC-1- Accounting and Financial management	4	4	25	75	100
	21MCA214Ob	OEC -1- Data Mining and Data Warehousing					
	21MCA214OC	OEC -1- Scripting Languages					
	21MCA2D	Debugging	2	2	100		100
	TOTAL		**30**	**26**			**700**

SEM	COU	TITLE	HRS	CRE	INT	EXT	TOT
III	21MCA315	CC-XIV-Mobile Application Development	5	4	25	75	100
	21MCA316	CC-XV- AI & Machine Learning	5	4	25	75	100
	21MCA317	CC-XVI-Internet of Things	4	4	25	75	100
	21MCA318	CC-XVII- Compiler Design	4	4	25	75	100
	21MCA319L	CC-XVIII- Mobile Application Development Lab	3	2	40	60	100
	21MCA320L	CC-XIX- Machine Learning Lab	3	2	40	60	100
	21MCA321E	EC-I-MOOC Courses	4				
	21MCA322Ea	EC-II- Block Chain Technology	4	4	25	75	100
	21MCA322Eb	EC-II-Cloud Computing					
	21MCA322Ec	EC-II- Digital Image Processing					
	21MCA3PSD	Programming Skill Development	2	2	100		100
		TOTAL	30	26			700
IV	21MCA423Ea	EC-III-Big Data Analytics	5	4	25	75	100
	21MCA423Eb	EC-III-Distributed Programming using .Net					
	21MCA423Ec	EC-III- Exploratory Data Analysis					
	21MCA424P	CC-XX-Project	---	10	50	50	100
		TOTAL		14			200
III	21MCA31S	Internship*	-	4	100		**100**
III	21MCA3MP	Mini Project*	-	4	100		**100**
		TOTAL		**90+14**			**2300+ 500**

Above the table:

NEHRU MEMORIAL COLLEGE [AUTONOMOUS]

MASTER OF COMPUTER APPLICATIONS

STRUCTURE 2021 -2022

Remarks:

- **EC1- MOOC Courses**: If the student does not complete EC1- MOOC within semester III upon valid reasons, the Head of the Department can permit the student to do the course in Semester IV.
- In case if the student has attended the course in NPTEL / Swayam courses and has failed to clear the examination within the 4 semesters, the department may conduct the examination and declare the result.

- **EC3: Courses conducted through online in Semester IV**

  The students can go and do the project work and simultaneously they can attend the elective Course 3 through online by the faculty members

  i. The syllabus will be covered through online classes (Google Classroom / Connectutor-nmclms/ Open EDX)
  ii. The teaching methodology will be through live lectures/videos/digital materials.
  iii. The practical classes if any shall be conducted through online IDEs.
  iv. The CIA will be carried out through Assignments/Seminars/Tests.
  v. The Semester Examinations shall be conducted through online mode.

Guidelines for Internship (Referred AICTE Intern Policy)

Internship Duration: 2-4 Weeks with 4 credits
Schedule: Summer vacation after 2nd or during 4th semester
Activities: Inter/Intra institutional/Govt/Industrial

Procedure:
i. Request Letter/ Email from the office of Training & Placement cell of the college or student should go to industry for the allotment.
ii. Confirmation Letter/ Email from the industry should be submitted to the department.
iii. Students must submit the joining Report/Letters/Email to the department which is submitted to the concern Industry
iv. Progress should be reported to mentor twice by the student
v. Students will submit training report after completion of internship.
vi. Training Certificate to be obtained from industry.

CREDIT DISRIBUTION

S .NO	COURSES CATEGORY		CREDITS	PERCENTAGE OF CREDITS TO TOTAL CREDITS
1	Core Theory	12 *4	48	
2	Core Practical	6*2	12	
3	Open Elective(1)		04	
4	Major based Electives (2)		08	
5	Supportive Courses-Maths (1)		04	
6	MOOC		04	
7	Project		10	
	Sub Total		**90**	
7	Skill Development		06	
8	Internship		04	
9	Mini Project		04	
	Sub TOTAL		**14**	
	TOTAL		**90+14**	

Assessment Pattern of Internal and External

Internal Theory:

CIA Test – I	**10 Marks**
CIA Test-II	**10 Marks**
Assignments (2)CUM Seminars	**05Marks**
Total	**25 Marks**

External Theory: 75 marks
Question Paper Pattern for Internal and External Assessment:

Section A: 10 Questions x 2 Marks = 20 Marks

(Two Questions from each unit)

Section B: 5 Questions x 5 Marks   = 25 Marks

(Internal Choice and one question from each unit. For Programming Language Courses, 1

question must be a program)

Section C: 3 Questions x 10 Marks = 30 Marks

(Answer any three out of 5 questions and one question from each unit)
Maximum marks: 100
Internal Practical

CIA Test-I	**15 Marks**
CIA Test-II	**15 Marks**
Observation/ Lab Exercises/Problem Solving Assignments	**10 Marks**
Total	**40**

External Practical:

Record	**10 Marks**
Practical Examination Logic - 30 Marks; Typing -10 Marks; Execution-10 Marks	**50 Marks**
Total	**60 Marks**

Course Code & Title	CC-1-PYTHON PROGRAMMING		
21MCA101	**Semester I**	**Credits: 4**	**Hours: 5**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn the basic concepts of Python ➢ understand sequencing structures ➢ conversant with OOPs concepts and Exceptions ➢ give an exposure to Pygame modules and creating visuals ➢ inculcate gaming concepts and its functionalities		

UNIT -- I:

Core python: python introduction – Origin – Features – Downloading and Installing python-Running python – Program output statement – Program input statement. **Python Basics:** Statements and Syntax – variable assignment – Identifiers – Memory Management – data types – conditional and loops -Guess the number game.   [**11 Hrs**]

UNIT -- II:

Sequences: Strings, Lists and Tuples: Sequences- strings – Strings and Operators – String-Only Operators – Built-in Functions – String Built-in Methods – Lists –Operators – Built-in Functions – List Type Built-in Methods- Special features of List – Tuples- Tuple Operators and Built-in Functions - Special features. **Mapping and Set Types**. **Functions:** calling functions – Creating Functions – Passing Functions – Types of arguments - – Variable Scope – Recursion - **Modules:** Modules and Files – Namespaces – Importing Modules – Features of Module Import- Module Built-in Functions – The hang man game- **Python Standard Library**: os, sys, random, math-datetime.   [**20 Hrs**]

UNIT -- III:

Errors and Exceptions: Exceptions- Exceptions in Python – Detecting and Handling Exceptions – Raising Exceptions – Assertions – Standard Exceptions
Object Oriented Programming: Classes – Class Attributes – Instances – Instance Attributes – Binding and Method Invocation – Inheritance – Built-in Functions - Objects and Classes – Inheritance –Customizing classes with Special methods- Overloading.   [**12Hrs**]

UNIT -- IV:

Introducing Pygame: History of Pygame-Installing Pygame-Using Pygame-Understanding Events-Opening a Display-Using Font module-Pygame in Action**. Creating Visuals:** Using Pixel Power-Working with Color – Using Images- Working with Surface Objects-Drawing with Pygame. **[12 Hrs]**

UNIT – V

Making Things Move: Understanding Frame Rate-Moving Straight Line-Diagonal Movement-Exploring Vectors-Using Vectors to create movement. **Accepting User Input:** Controlling the Game-Understanding Keyboard Control – Implementing Mouse Control. **Sounds:** Introduction-Storing Sounds-Sound Formats-Creating Sound Effects-Playing Sounds with Pygame: Sound Objects-Sound Channels-Mixer Functions-Hearing in Mixer. Playing Music with Pygame: Obtaining Music – Playing Music – Hearing Music. - The Blackjack game. **[20 Hrs]**

Self Study: Joystick Controls

Books for Study:

1. Wesley J.Chun,"*Core Python Programming*", Second Edition, Pearson Education,Inc., 2007. ISBN 978-81-317-1188-0. **UNIT-I** Chapter 1,2.1,2.2,2.6-2.9,3,8 **Unit-II:** Chapters 6,7,11.1-11.6,11.8,11.9,12 **Unit –V:** Chapters: 9 , 10 , 13.1-13.8,13.11-13.13,15
2. Will McGugan, "*Beginning Game Development with Python and Pygame*", Apress, 2007. ISBN-13 (pbk): 978-1-59059-872-6. ISBN-10 (pbk): 1-59059-872-5 **Unit-III:** Chapters:3 & 4. **Unit-IV:** Chapters 5,6 10. **Unit-V:** Chapter 7.

Books for Reference:

1. Tony Gaddis, "*Starting out with python*", 2nd edition, 2012, Addison Wesley, Pearson
2. Michael Dawson, "*Python programming for the absolute beginner*", Premier press, 2003
3. Jennifer Campbill, Paul Gries, Jason Montojo and Greg Wilson, "*Practical programing, An Introduction to computer science using Python*",2009
4. Al Sweigart, "*Invent your own computer games with python*", 2nd edition, 2008

Web Reference
1. https://www.tutorialspoint.com/python/
2. https://docs.python.org/3/
3. https://www.guru99.com/python-tutorials.html
4. https://www.pygame.org/wiki/

Course Outcomes:
 On completion of the course, the student will be able to

CO1: develop simple console based games using basic concepts		**K2**
CO2: design and develop applications using sequences		**K3**
CO3: demonstrate the usage of files and pattern matching		**K4**
CO4: apply OOP concepts in creating attractive games		**K3**
CO5: build interactive games using pygame		**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	S	S	S	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	M	M	S	S	M	S	S
CO3	S	M	M	M	M	M	M	S	S	M	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-II-DATA STRUCTURES AND ALGORITHMS		
21MCA102	**Semester II**	**Credits: 4**	**Hours: 5**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand basic data structures such as arrays, linked lists, stacks and queues ➢ learn about trees, operations and its implementation. ➢ solve problem involving graphs, trees and heaps ➢ learn various sorting and searching techniques. ➢ enhance the problem solving skill using Recursive algorithms		

PREREQUISITE:
Problem Solving Using C & C++

UNIT -- I:
Design and analysis of algorithms: From problems to programs – Abstract data types – Data types, data structures and abstract data types- Basic data types**:** The data type 'list' – Implementations of lists – Stacks – Queues. **[15 Hrs]**

UNIT -- II:
Trees: Basic terminology – The ADT tree- Implementation of trees- Binary trees- Basic operations on sets - Introduction to sets – Bit-vector implementation of sets- Linked-list implementation of sets- Hash table data structures- Priority queues – implementation of priority queues. **[16Hrs]**

UNIT -- III:
Directed Graph: Basic definitions- Representation of directed graph - The Single Source shortest path problem – The All-pairs shortest path problem- Traversals of directed graphs – Directed acyclic graphs – Strong components. Undirected Graph: Definitions – Minimum cost spanning trees- Traversals- Articulation and bi-connected components. **[16 Hrs]**

UNIT -- IV:
Sorting: Sorting arrays-Sorting by straight insertion, selection & exchange- Insertion sort by diminishing increment - Tree sort - Partition sort - Sorting sequential files - Straight merging-Natural merging. **[18 Hrs]**

UNIT -- V:

Recursive Algorithms - Introduction – two examples of recursive programs – Backtracking Algorithms – The knight's tour problem - The eight queen's problem - The   optimal selection problem -Searching Techniques. [**10 Hrs**]

Books for Study:
1. Alfred V.Aho, John E.HopCroft and Jeffrey D.Ullman, *"Data structures and Algorithms",* Addison Wesley Longman private limited, New Delhi, Fourth Indian Reprint 2001, (Chapters: 1.1 – 1.3, 2.1 – 2.4, 3.1 – 3.4, 4.1 – 4.11 except 4.2, 4.8 & 4.9, 6.1 – 6.7, 7.1 – 7.4. **Unit I, II, and III).**ISBN: 81-7808-102-4.
2. Niklaus Wirth, *"Algorithms + Data structures = Programs"*, Prentice Hall of India Limited, New Delhi, 1999, (Chapters: 2.1,2.2.1-2.2.6,3.1,3.3,3.4,3.5,3.7. **Unit IV, V).** ISBN: 81-203-0569-8.

Books for Reference:

1. Ellis Horowitz and SartajSahni, *"Fundamentals of Computer Algorithms",* Galgotia Publications, New Delhi, 1985.
2. Trembley and Soreson, *"An Introduction to data structures with Applications"*, Second Edition, McGraw Hill, New Delhi, 1985.

Web References:

1. https://nptel.ac.in
2. https://geeksforkeeks.org/knights-tour-problem
3. https://www.geeksforgeeks.org/backtracking
4. https://youtu.be/0DeznFqrgAl

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: describe stack, queue and linked list operation. **K2**

CO2:choose appropriate data structure as applied to specified problem definition. **K4**

CO3: manipulate the operations on various data structures. **K3**

CO4: apply the concepts learned in algorithms to various domains **K3**

CO5: use linear and non-linear data structures **K3**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	S	M	S	S	S	M	S
CO2	S	S	S	M	M	S	M	S	S	S	M	S
CO3	S	S	S	S	M	S	M	S	S	S	M	S
CO4	S	S	S	M	S	S	S	S	S	S	M	S
CO5	S	S	S	M	S	S	S	S	S	S	M	S

Prepared By	Mrs.K.Ponvel Azhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-III- OPERATING SYSTEM		
21MCA103	**Semester I**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn about the objective and functions of operating system, system structure and system calls. ➢ gain the knowledge on process states, principles of concurrency and deadlock. ➢ inculcate the policies of memory management, virtual memory and scheduling. ➢ Study about I/O and file organization ➢ understand the architecture of Unix Operating System.		

PREREQUISITE:
None

UNIT -- I:
INTRODUCTION TO OS AND ITS SERVICES:
Objectives and functions of Operating System: Batch Processing System – Time Sharing System – Multiprogramming – Distributed Operating System and Parallel System - Operating System Interface – System calls- System Structure. **[5Hrs]**

UNIT -- II:
PROCESS DESCRIPTION AND CONTROL:
Process States – Process Description – Process Control – Processes & threads. Principles of Concurrency: Mutual Exclusion – Semaphores. Principles of Deadlock: Prevention – Avoidance – Detection & Recovery. **[20Hrs]**

UNIT -- III:
MEMORY MANAGEMENT:
Partitioning –Paging – Segmentation – Virtual Memory - Demand Paging – Page Replacements.Scheduling: Uniprocessor scheduling – types of scheduling – Scheduling Algorithms- Multiprocessor scheduling. **[15Hrs]**

UNIT -- IV:

I/O Organization: Evolution of I/O function- DMA – Design objectives – I/O Buffering – Disk Scheduling – Disk Cache. **File Organization**: File Directories-File sharing –   Record Blocking – Secondary Storage Management.   **[10 Hrs]**

UNIT --V:

The Unix Architecture and Command Usage: The Unix Architecture-Features of Unix – POSIX and the Single UNIX Specification –Locating Commands – Internal and External Commands- Command Structure. The File System: The File – File Name – The Parent Child Relationship – The HOME variable: The Home Directory – pwd-cd-mkdir-rmdir- Absolute Pathnames- Relative pathnames-ls-UNIX file System

Case Study: Commands: General purpose Utilities: cal-date-echo-printf- bc –who- uname. File related Commands: cat – cp – rm – mv – more – file – wc – cmp- comm. –diff – tar-zip and unzip – Basic File attributes: ls – file ownership- file permission – chmod- directory permission –changing ownership**.**   **[10Hrs]**

Books for study:

1. William Stallings, "*Operating Systems, Internals & Design Principles*",8thEdition, Prentice Hall, 2014.AADD UNITS
2. Sumitabha Das, "UNIX Concepts and Applications", Fourth Edition, Tata McGraw-Hill Publishing Company Limited.

Book for Reference:

1. M.Milancovic, "*Operating System Concepts and Design*", Second Edition, McGraw-Hill International Edition.

Web References:

1. www.geeksforgeeks.org
2. www.tutorialspoint.com
3. www.studytonight.com

Course Outcomes:

On the successful completion of the course, students should be able to

CO1:	describe the services provided by operating systems, system calls and the structure system.	**K2**
CO2:	illustrate process description, mutual exclusion, deadlock detection and starvation.	**K3**
CO3:	categorize the management of main, virtual memory and scheduling algorithms.	**K4**
CO4:	describe I/O and file organization.	**K2**
CO5:	recognize the concepts of Unix architecture.	**K2**

Mapping of Cos with PSOs &Pos:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	M	M	M	S	S	M	S	S
CO2	S	S	S	M	M	M	S	S	S	M	M	S
CO3	S	S	S	S	S	M	M	S	S	M	S	S
CO4	S	M	M	S	M	M	M	S	M	M	M	S
CO5	S	S	S	S	S	M	M	S	S	M	S	S

Prepared By	Ms K Ponvel Azhagu lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-IV- COMPUTER SYSTEM ARCHITECTURE		
21MCA104	**Semester I**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ study various data types and its representation. ➢ Inculcate instruction formats, computer registers and CPU Organization. ➢ impart knowledge in various processing methods. ➢ understand various peripheral devices, I/O interface, asynchronous and serial communication interface. ➢ learn various memory organizations.		

PREREQUISITE:
   None

UNIT -- I:
Data Representation - Data Types - Complements - Fixed-Point representation- Floating Point representation- Other Binary Codes- Error Detection codes. **[12Hrs]**

UNIT --II:
Instruction Codes - Computer Registers - Computer Instructions - Timing and Control – Instruction Cycle - Memory Reference Instructions –Input-Output and Interrupt. CPU: General Register Organization –Stack Organization - Instruction Format - Addressing Modes - Data Transfer And Manipulation- Program Control. **[13Hrs]**

UNIT --III:
Pipeline and Vector Processing: Parallel Processing - Pipelining – Arithmetic Pipeline – Instruction Pipeline – RISC Pipeline – Vector Processing: Vector Operations – Matrix multiplication – memory Interleaving. Array Processors: Attached Array Processor – SIMD Array Processor. **[13Hrs]**

UNIT -- IV:

Input- Output Organization: Peripheral Devices - Input-Output Interface - Asynchronous Data Transfer - Modes of Transfer -Priority Interrupt - DMA - IOP .   **[12Hrs]**

UNIT --V:

Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory -Virtual Memory - Memory Management Hardware.   **[10Hrs]**

Book for Study:

1. M.Morris Mano, "*Computer System Architecture*", Third Edition, Prentice Hall of India,2005.

Books for Reference:

1. William Stallings, "*Computer Organization and Architecture*", Fifth Edition, Pearson Education,2001.
2. Malvino A. P. and Donald P. Leach, "*Digital Principles and Applications*", Seventh Edition, McGraw Hill Publications, 2002
3. John P.Hayes, "*Computer Architecture and Organization*", Third Edition, Tata McGraw Hill,1998.

Web References:

1. http://expandknowledge.net/csc106/
2. https://nptel.ac.in/courses/106103068/
3. https://www.electronics-tutorials.ws/combination/comb_1.html
4. https://youtu.be/ksAok2NhzBs
5. https://study.com/academy/lesson/associative-memory-in-computer-architecture.html

Course Outcomes

On the successful completion of the course, students should be able to

CO1: Classify different types of data and representation of data	**K2**
CO2: Explain an instruction set capable of performing a specified set of operations	**K2**
CO3: understand various types of processing techniques.	**K2**
CO4: Categorize modes of data transfer and Compare different ways of communication with I/O Devices	**K4**
CO5: Distinguish Different types of memory	**K1**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	M	S	S	M	M	S	M	S	S	W	M	S
CO2	S	S	S	S	S	S	S	S	S	M	M	S
CO3	S	M	W	M	M	M	S	S	M	M	M	M
CO4	S	S	S	S	M	M	S	S	S	M	M	S
CO5	M	M	M	M	S	S	M	S	S	S	M	M

Prepared By	Dr.K.Deepa
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-V-MATHEMATICS FOR COMPUTER APPLICATIONS		
21MCA105M	**Semester I**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➤ Understand the concepts of Logic and rules of Inferences. ➤ gain the knowledge on Set Theory with its functions, ➤ Learn about Number theory, Congruences and its applications. ➤ inculcate the Probability concepts and Probability Distributions. ➤ Impart knowledge in Samples, Populations and significance of evidences		

Unit I: Logic
Propositional Logic - Applications of Propositional Logic - Propositional Equivalences - Predicates and Quantifiers - Nested Quantifiers- Rules of Inference.
[12Hrs]

Unit II: Proofs, Sets and Functions
Introduction to Proofs -Proof Methods and Strategy –Sets-Set Operations-Functions- Sequences and Summations- Cardinality of Sets. **[12Hrs]**

Unit III: Number Theory
Divisibility and Modular Arithmetic - Integer Representations and Algorithms-Primes and Greatest Common Divisors - Solving Congruences- Applications of Congruences. **[12Hrs]**

Unit IV: Probability
Random Variables and Expectations-Expectations and Expected Values-The Weak Law of Large Numbers-Using the Weak Law of Large Numbers-Useful Probability Distributions. **[12Hrs]**

Unit V: Inference

Samples and Populations: The sample mean-confidence intervals. The significance of evidence: Evaluating Significance-P value-Comparing the Mean of Two Populations–F test-Chi square test- P value hacking**.** **[12Hrs]**

Text book(s):

1. David Forsyth, Probability and Statistics for Computer Science, Springer,ISBN 978-3-319-64410-3 (eBook),https://doi.org/10.1007/978-3-319-64410-3,2012

   Unit IV: Chapter 4 and 5
   Unit V: Chapter 6 and 7

2. Kenneth H. Rosen, Discrete Mathematics and its Applications,Seventh Edition, McGraw Hill Publications,2012
   Unit I: Chapter 1: Sections 1.1 to 1.6
   Unit II: Chapter 1: Sections 1.7-1.8, Chapter 2: Sections 2.1 – 2.5
   Unit III: Chapter 4: Sections 4.1-4.5

References

1. Douglas C Montgomery and George C Runger, Applied Statistics and Probability for Engineers, Third Edition, 2003
2. Kolman, Busby, Ross,Discrete Mathematical Structures, Third edition, Prentice Hall, 1995
3. Sheldon M Ross, Introduction to Probability Models, Academic Press, 2014
4. Tremblay J.P , Manohar R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill ,1997
5. Victor Shoup, A Computational Introduction to Number Theory in Algebra, Cambridge University Press, 2009

Prepared By	Dr V Savithri
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-VI PYTHON PROGRAMMING LAB		
21MCA106L	**Semester I**	**Credits: 2**	**Hours: 3**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ develop simple programs using python ➢ create programs using sequences ➢ design applications using functions and modules ➢ create oops based applications		

PREREQUISITIES
Programming in JAVA

Solve problems using
- Operators
- Control structures
- Console based simple game:
- Data structures: String, List, Tuple, Dictionary and Set
- Game using data structure
- OOPs related games
- 2D games using pygame methods:
    1. Usage of colors in Game
    2. Design and develop racing games
    3. Design and develop asteroid game
- Create a game with your own ideas

Course Outcomes:
On completion of the course the student will be able to

CO1: design console based simple games	K2
CO2:analyze and develop game applications using sequences	K4
CO3: apply OOP concepts to develop game applications	K3
CO4:design and develop real world game applications using Pygame	K6

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	M	M	S	S	S	M	M	S
CO2	S	S	S	S	M	M	S	S	S	M	M	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-VII-Data Structures using C LAB		
21MCA107L	**Semester II**	**Credits: 2**	**Hours: 3**
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ give practical exposure to develop distributed applications using RMI ➢ create web based distributed applications using Java Servlets and Java Server Pages ➢ generate enterprise applications using Enterprise Java Beans(EJB) ➢ classify the given problems and develop the cod using J2EE		

PREREQUISITIES
Programming Using C

1. Stack Implementation

2. Queue

3. Linked List

4. Doubly Linked List

5. Tree Traversals

6. Graph-BFS, DFS

7. Single Source Shortest Path- Dijiksta's

8. All pair Shortest Path

9. Spanning Trees

10. Greedy Algorithm

Course Outcomes:

On completion of the course the student will be able to

CO1: develop linear data structures	K2
CO2: implement operations using Linked List	K4
CO3: apply dynamic programming to find shortest paths	K3
CO4: apply greedy algorithm to sort the data set.	K6

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	M	M	S	S	S	M	M	S
CO2	S	S	S	S	M	M	S	S	S	M	M	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code	Soft Skills	Semester	Hrs	Cre
21MCA1SS		I	2	2

The course aims to
- ➢ Improve self awareness and development.
- ➢ Develop effective communication skills.
- ➢ Impart knowledge in business etiquettes.
- ➢ Develop self confidence and function effectively in different environments.

UNIT I: Self Awareness & self Development
Self Awareness: Self Assessment, Self Appraisal, SWOT. Goal setting: Personal & career, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting.
Self Development: Career Planning, Personal success factors, Handling failure, Depression and Habit, Goal Setting & SWOT analysis, prioritization. **[4hrs]**

UNIT II: Communication Skill
Communication: Importance of Communication, Types of Communication, Barriers to Effective communication, Effective communication.
Speaking Skills: Public Speaking, Presentation skills, Group discussion: Importance of speaking effectively, speech process, message, audience, speech style, feedback, conversation and oral skills, fluency and self expression, body language phonetics and spoken English, speaking techniques, word stress, correct stress patterns, voice quality, correct tone, types of tones, positive image projection techniques.

Listening Skills: Law of nature: you have 2 ears and 1 tongue so listen twice and speak once is the best policy, Empathic listening, and Avoid selective listening.

Group Discussion: characteristics, subject knowledge, oral and leadership skills, team management, strategies and individual contribution and consistency.

Presentation skills: planning, preparation, organization, delivery.
Written Skills: Formal & Informal letter writing, Report writing, Resume writing: Sentence structure, sentence coherence, emphasis.Paragraph writing. **[6 hrs]**
.

UNIT III: Corporate / Business Etiquettes

Corporate / Business Etiquettes: Corporate grooming & dressing, Email & telephone etiquettes, etiquettes in social & office setting: Understanding the importance of professional behaviour at the work place, Understanding and Implementing etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting.

Importance of first impression, Grooming, Wardrobe, Meeting etiquettes (targeted at young professionals who are just entering business environment) , Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities.   [**4 hrs**]

UNIT IV: Interpersonal relationship

Team work: Team effectiveness, Group discussion, Decision making : Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity.

Leadership: Leaders' role, responsibilities and skill required - Understanding good Leadership behaviors, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules.   **[4 hrs]**

UNIT V:

Time management Skill: The Time management matrix, applying the Pareto Principle (80/20 Rule) to time management issues, To prioritize using decision matrices, To beat the most common time wasters, How to plan ahead, how to handle interruptions , To maximize your personal effectiveness, How to say "no" to time wasters, develop your own individualized plan of action.

Stress management: understanding the stress & its impact, techniques for handling stress

[2Hrs]

Books for Reference:
1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press.
2. Developing Communication Skill by Krishna Mohan, Meera Banerji, McMillan India Ltd.
3. English for Business Communication by Simon Sweeney, Cambridge University Press.

Verified By	Dr.K.Tamilmani

Course Code & Title	CC-VII- DISTRIBUTED PROGRMMING USING J2EE		
21MCA208	Semester II	Credits: 4	Hours: 5
Cognitive Level	K2: Understand K3: Apply K4: Analyze		
Learning Objectives	**The course aims to** ➢ understand distributed environment, its architecture ➢ learn the concepts of RMI to develop distributed applications ➢ impart knowledge in web based distributed applications using Java Servlets ➢ give exposure to Java Server Pages ➢ inculcate enterprise applications using Enterprise Java Beans(EJB)		

PREREQUISITIES
Programming in JAVA

UNIT -I
Distributed Hardware Architecture: Evolution of Personal Computer – PC to PC Communication – Local Area Network – File Server Architecture – Client-Server Architecture – Database Server Architecture – Corporate Network – Intranet – Wide Area Network – Internet.
Distributed Software Architecture: Mainframe – File Server - **Client-Server Architecture**: Single – two tier–three tier–N-tier Architecture–Distributed Application.   [**10 Hrs**]

UNIT - II:
Distributed Computing using RMI: Introduction - RMI Architecture – RMI Exceptions – Developing Applications with RMI –RMI with Database Connectivity. **Java Servlets:** Servlet Life Cycle – Generic and HTTP Servlet – Servlet with Database Connectivity- Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class.
[**18 Hrs**]

UNIT - III:
Java Server Pages: JSP Basic Concepts – JSP Elements – Expressions – Scriplets – Request and Response Objects – Redirection and Forwarding –JSP with Database Connectivity - **Session Tracking:** Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class.   [**16 Hrs**]

UNIT - IV:
The Struts Framework: Introduction - J2EE Platform: J2EE Architecture – Containers – **J2EE Technologies**: Component – Service – Communication Technologies – Developing J2EE Application. **[16 Hrs]**

UNIT - V:
EJB Architecture and Design: Introduction to EJB – The EJB Container and its Services – Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence. **[15 Hrs]**

Books for Study:
1. Ivan Bayross, "*Web Enabled Commercial Applications Development using Java 2*", Edition 2000, BPB Publications. ISBN 10: 8176563560 ISBN 13: 9788176563567
2. Jason Hunter with William Crawford, "*Java Servlet Programming*", Shroff Publishers & Distributors Pvt. Ltd, ISBN 1-56592-391-XE
3. Phil Hanna, "*JSP 2.0 The Complete Reference*", Tata McGraw Hill Publishing Company Limited, ISBN-10: 0072224371; ISBN-13: 978-0072224375.
4. James Holmes,"*Struts :The Complete Reference",* Second Edition, Tata McGraw Hill Publishing Company Limited., *ISBN*: 9780070658455 .
5. Subrahmanyam Allamaraju, "*Professional Java Server Programming – J2EE Edition Volume 1",* Shroff Publishers & Distributors Pvt. Ltd, *ISBN* 0-13-015592-6.

Web References:
1. www.j2eebrain.com
2. www.tutorialspoint.com

Course Outcomes:
Upon completion of the course the student will be able to

CO1: identify distributed hardware and software architecture and distributedenvironment	**K2**
CO2: identify RMI architecture and Java Servlets, apply the same to develop variousapplications using RMI and Servlets	**K3**
CO3: apply the concepts of Java Server Pages to write various real time web based distributed applications	**K3**
CO4: build applications in J2EE server using Java Servletsand Java Server Pages using J2EE architecture	**K6**
CO5: design distributed applications that run on EJB server using Session and Entity bean with Enterprise Java Beans (EJB), its architecture	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Ms.V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-IX-DATA BASE DESIGN		
21MCA209	**Semester I**	**Credits: 4**	**Hours: 5**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand the conceptual data models, entities, attributes ➢ impart knowledge in design and create tables in database ➢ Familiar with normalization techniques. ➢ introduce the concepts of transactions ➢ know the concept of database system architecture, distributed database		

Unit-I:

Introduction to Database Systems: Overview **-** File Systems versus a DBMS - Advantages of a DBMS -Describing and Storing Data in a DBMS - Queries in a DBMS - Transaction Management - Structure of a DBMS. **Conceptual Design and the ER model:** Overview of Database Design – Entity Relationship Data Model - Additional Features of the ER Model-Conceptual Design using ER Model - Conceptual Design for Large Enterprises –**Relational Algebra and Calculus**: Relational algebra – Relational calculus.   **[18 Hrs]**

Unit-II:

SQL: The Query Language -The Form of a Basic SQL Query-UNION,INTERSECT, and EXCEPT - NESTED Queries-Aggregate Operators-Null Values-Embedded SQL-Cursors-Dynamic SQL. **Security:** Introduction to database security-views-Access Control-Discretionary Access Control-Mandatory Access Control-Additional issues related to security.   **[18 Hrs]**

Unit-III:

Database Design: Relational – First normal form – Functional dependencies – Decomposition – Boyce-Codd normal form – Third Normal Form – Fourth normal form - More normal forms.
                                                                                                        [12Hrs]

Unit-IV:

Transactions Concepts: Transaction state – concurrent execution – serializability – recoverability – testing for serializability. **Concurrency Control:** Lock based protocols – timestamp based protocols – validation based protocols – Deadlock Handling. [**15 Hr**

Unit-V:

Data base System Architecture: Centralized and client server architecture – server system architecture – parallel systems – Distributed systems - Network types. **Distributed Database:** Distributed data storage - distributed transactions – commit protocols – distributed query processing. [**12 Hrs**]

Books for study:
1. Raghu Ramakrishna and Johannes Gehrke *"***Database Management System *"*,** McGraw Hill publication, 2ⁿᵈ Edition , 2002, ISBN: 0-07-246535-2 (Unit I & II).
2. C.J.Date, *"An* **Introduction to Database system",** Addison Wesley publication, 7ᵗʰ edition, 2000, ISBN: 81-7808-231-4 (Unit III).
3. Henry F.Korth and Abraham Silberschatz, *"Database System concepts"***,** 4th Edition McGraw Hill, 2002, ISBN: 0-07-120413-X (Unit IV & V).

Books for Reference:
1. BepinC.Desai, *"An Introduction to Data base system***",** Galogotia publications Private limited.
2. Ivan Bayross, *"SQL and PL/SQL",* BPB Publications, New Delhi.

Web References:
1. https://en.wikibooks.org/wiki/Introduction_to_Computer...Systems/Database
2. https://www.c-sharpcorner.com/UploadFile/.../types-of-database-management-systems/

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: understand the fundamentals of database system		**K2**
CO2: design and create tables in database and execute queries.		**K4**
CO3: design database based on a data models using normalization.		**K4**
CO4: apply transaction concept		**K3**
CO5: illustrate database system architecture and distributed database		**K2**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	M	S	S	S	M	M	S
CO5	S	M	M	S	S	M	S	S	S	S	S	S

Prepared By	Dr.D.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-X-SOFTWARE ENGINEERING		
21MCA210	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ understand the basic concepts of software engineering ➢ know various phases of software development life cycle ➢ give exposure to the preparation of SRS. ➢ learn different design process and test strategies ➢ familiarize with the importance of Quality to design and develop correct and robust software products		

PREREQUISITIES

   Data Structures and Algorithms
   Data Base System

UNIT - I:

Introduction to Software Engineering: Software – The changing nature of software – A generic view of Process: Software Engineering : A Layered Technology – A process framework - Process Models: Perspective Models – The Waterfall Model – Incremental Process Models – Evolutionary Process Models - Specialized Process Models. **[12 Hrs]**

UNIT - II:

Requirements Engineering: Requirements Engineering Tasks – Initiating the Requirements Engineering Process – Eliciting Requirements – Developing use – cases. **Building the Analysis Model:** Requirement Analysis – Analysis Modeling approaches – Data Modeling concepts – Object Oriented Analysis – Scenario Based Modeling – Flow   Oriented Modeling – Class based Modeling – Creating a behavioral modeling. **[12 Hrs]**

UNIT- III

Design Engineering: Design within the context of Software Engineering – Design   Process and Design Quality – Design Concepts –The Design Model – Pattern Based Software Design. Creating an Architectural Design – Software Architecture – Data   Design– Mapping Data flow into software Architecture. [**12 Hrs**]

UNIT– IV

Estimation: The project planning process – software scope and feasibility – Resources – Software Project Estimation – Decomposition Techniques – Empirical Estimation   Models – Estimation for object – oriented projects – The Make/Buy Decision. Testing Strategies: Unit testing – Integration testing-Validation testing – System testing -White Box Testing-Basic Path

Testing-Control Structure Testing-Black Box Testing. **[12 Hrs]**
UNIT– V
Reengineering: Business Process Reengineering – Software Reengineering – Reverse Engineering – Restructuring – Forward Engineering. Quality Management: Quality concepts – Software Quality Assurance – Formal Approaches to SQA. **[12 Hrs]**
Case Study: Software Requirement Specification, Data base Design, UI Design, Data Flow Diagrams and Test cases preparation
Book for Study:
1. Roger S. Pressman, *"Software Engineering – A Practitioner's Approach"*, 7th Edition, McGraw – Hill International Edition, ISBN: 007-124083.
Book for Reference:
1. Richard Fairley**,** *"Software Engineering concepts"* McGraw Hill Publication

Web reference:
1. htttp://www.tutorialspoint.com/software_engineering.
Course Outcomes:
On completion of the course the students will be able to
CO1: Explain various process models for a software project development   **K1**
CO2: Classify the requirements and prepare SRS   **K4**
CO3: Create architectural design, Data flow Design and procedural design   **K6**
CO4: Estimate time, cost and effort for the specific software to be developed   **K2**
CO5: Apply different testing techniques to test the software and Create test plans and strategies   **K3**
CO6: Summarize various reengineering process and Quality concepts for quality assurance   **K2**
Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	M	S	S	S	S	S	S	S	S
CO4	S	S	M	M	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S
CO6	S	S	M	M	M	M	S	S	S	S	S	S

Prepared By	Mr.C.Yogaraj
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XI- Cryptography and Network Security		
21MCA211	Semester : II	Credits : 4	Hours : 4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4:Analyze K6: Create		
Learning Objectives	**The course aims to** ➢ impart knowledge in security basics. ➢ understand various cryptography techniques. ➢ Give exposure to Hash functions and other authentication mechanisms. ➢ Learn various types of system securities. ➢ Understand IP security with its applications and Web Security mechanisms.		

Unit – I

Introduction about Computer Security Concepts- Examples-Challenges of Computer Security-OSI Security Architecture-Security Attacks-Passive and Active – Security Services-Authentication-Network Security Model- Classical Encryption Techniques-Symmetric Cipher Model- Substitution and Transposition Techniques.   **[12 Hrs]**

Unit – II

Block Ciphers & Public Key Cryptography - Data Encryption Standard(DES)-Advanced Encryption Standard(AES)-Triple DES-Blowfish-RC5 Algorithm – Public Key Cryptography – Principles of Public Key Cryptosystems-The RSA algorithm-Key Management – Diffie-Hellman Key Exchange-Elliptic Curve Arithmetic –Elliptic Curve Cryptography.   **[12 Hrs]**

Unit – III

Cryptographic Hash Functions and Digital Signatures –Message Authentication Requirement and Functions – Message Authentication Code- Hash Functions – Security Requirements for Cryptographic Hash Functions- MD5(Message Digest Algorithm)-SHA(Secure Hash Algorithm) –HMAC(MACs based on Hash Functions)-CMAC(Cipher based Message Authentication Code)-Digital Signatures – ElgamalDigitial signature- DSS(Digital Signature Standard)- Schnorr Digital Signature Scheme. **[12 Hrs]**

Unit – IV

System Security and User Authentication-Authentication Applications and Services-Kerberos-X.509 Authentication Services -Network and Internet Security-Internet Firewalls – Types for Firewall-Firewall Designs - SET(Secure Electronic Transaction)-Intruders – Countermeasures. **[12 Hrs]**

Unit – V

Email, IP and Web Security-Security Services for Email attacks- Cryptographic Keys – Pretty Good Privacy – S/MIME-IP Security- Overview of IP Security –Applications of IP Security- ESP (Encapsulating Security Payload) – Internet Key Exchange- Web Security – SSL(Secure Sockets Layer)- TLS(Transport Layer Security)-SSH(Secure Shell). **[12 Hrs]**

Books for Study:

1. William Stallings, "Cryptography and network Security - Principles and Practices", Prentice Hall (Pearson Education), 5thEdition, 2010

Book for Reference:

1. AtulKahate, "Cryptography and Network Security", Tata MgGraw Hill Publications, New Delhi.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1	Know the security Trends and Security Techniques	**K2**
CO2	Gain knowledge of Data Encryption Standards	**K1**
CO3	Learn the uses of Hash functions	**K3**
CO4	Apply the concepts of Public Key Encryption.	**K1**
CO5	Identify the various authentication mechanisms in applications	**K4**
CO6	Understand system security breaches and principles	**K2**

Prepared by	Ms. R.Kalaivani
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-XII-J2EE LAB		
21MCA212L	Semester IV	Credits: 2	Hours: 3
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ give practical exposure to develop distributed applications using RMI ➢ create web based distributed applications using Java Servlets and Java Server Pages ➢ generate enterprise applications using Enterprise Java Beans(EJB) ➢ classify the given problems and develop the cod using J2EE		

PREREQUISITIES
Programming in JAVA

Distributed applications using RMI
a. Simple RMI application
b. RMI application with a server and more than one client
c. RMI application with Database Connectivity

Implementing Servlet
i. Simple Servlet
ii. Servlet with JDBC
iii. Servlet Session Tracking

Implementing Java Server Pages(JSP)
i. Simple JSP
ii. JSP with JDBC
iii. JSP with Session Tracking

Enterprise Java Beans
a. Session Bean
b. Entity Bean

Problem solving Assignments
The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes:

On completion of the course the student will be able to

CO1: Design various real time applications using RMI **K3**

CO2: employ Java Servlets to develop various real time web based distributed **K4**
applications.

CO3: Build applications in J2EE server using Java Server Pages **K6**

CO4: Design and develop distributed applications that run on EJB server **K6**
using Session and Entity bean

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	M	S	S	S	M	S	S

Prepared By	Ms.V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XIII- RDBMS LAB		
21MCA213L	**Semester I**	**Credits: 2**	**Hours: 3**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ Educate developing query using DDL,DML,DCL,TCL ➢ Understand and create tables in database using logical operator, set operator, sequence ➢ prepare SQL reports ➢ learn the implementation of cursors, procedure and function		

PREREQUISITE:
> Data Base System

Solve the problems using

- DDL, DML, DCL &   TCL Commands
- Queries with key constraints

- Queries with operators: Logical Operators and Set Operators
- Nested Sub Queries: Sub query and Join
- Built in functions of SQL
- Views and Sequence
- SQL Reports
- Cursors: Implicit and Explicit
- Triggers
- Procedures and Functions
- Package

Problem solving Assignments
The course instructor shall provide a list of programming assignments for solving problems to the students and the students have to solve the problems by writing appropriate code & demonstrate the same during the course duration.

Course Outcomes

On the successful completion of the course, students will be able to

CO1: design and implement database schema for the given problem   **K2**
CO2: populate and query using DDL,DML,DCL,TCL   **K3**
CO3: prepare SQL reports, create implicit and explicit cursor and **K4** implement triggers, procedures and function
CO4: generate a normalized database for the given real life application   **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	M	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr.D.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	**OEC-I -ACCOUNTING AND FINANCIAL MANAGEMENT**		
21MCA214Oa	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learnthe concepts and conventions of accounting. ➢ acquire the skills to prepare Journal, Ledger andTrial Balance learn about various types of accounts ➢ know the preparation of final accounts with adjustments ➢ give exposure to the preparation of budgetary control. ➢ understand the concepts of Capital budgeting.		

PREREQUISITE: None

UNIT - I:
Introduction to Accounting – Book Keeping – Definition – Advantages – Accounting concepts and conventions – Double Entry Book – Differences between double entry system and single entry system – Classification of Accounts.   **[12 Hrs]**

UNIT - II:
Journal – Accounting Cycle – Practical approach to journal – Ledger – Format of Journal to Ledger – Trial Balance.   **[12 Hrs]**

UNIT - III:
Trading Account – Profit and Loss Account – Balance Sheet – Definition – Objectives – Difference between Trial balance and Balance sheet – adjustment entry (Closing Stock, Outstanding, Prepaid, Depreciation).   **[12 Hrs]**

UNIT - IV:
Budgeting and Budgetary control – Definition – Advantages – Limitation – main steps - objective- functions of budget controller – type of budgets – preparation of various functional budgets – preparation of production budget – cash budget – flexible budget only**.**   **[12 Hrs]**

UNIT– V

Capital Budgeting – meaning, need and importance – methods – payback period method – Accounting Rate of Return (ARR) – Discounted Cash Flow method, NPV – IRR – Merits and Demerits. [**12 Hrs**]

(**75% Theory, 25% Problem**)

Books for Study:

1. T.S.Ready and A.Murthy, "*Financial Accounting*", Margham Publication-2011
2. Dr.S.N.Maheswari, "*Principles of Management Accounting*", Sultan Chand & Sons, 5th Edition, 2010

Books for Reference:
1. M.C.Shukla, T.S.Grewal-S.C.Gupta, "*Advanced Accounts*", (Volume-I) Sultan Chand & Sons, New Delhi-2002
2. R.L.Gupta, M.Radhasamy, "*Advanced Accountancy*", Sultan Chand & Sons, New Delhi, 2011
3. R.S.N.Pillai&Bagavathi, "*Fundamentals of Advanced Accounting*", Sultan Chand & Sons, New Delhi, 2007
4. M.Y.Khan&P.K.Jain, "*Management Accounting*", Tata McGraw Hill Education Private Ltd, 5th Edition
5. Prof.Jawaharlal, "*Advanced management Accounting*", Sultan Chand & Sons, New Delhi, Third Edition-2013

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: recognize the basics of concepts and conventions of accounting	**K1**
CO2: apply accounting principles to practice the preparation of journal, ledger and Trail balance preparation	**K3**
CO3: identify the financial position of the business concern	**K2**
CO4: analyze budgeting and its control	**K4**
CO5: understand the concepts of capital budgeting	**K2**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	M	W	W	M	M	M	S	S	M	W	S
CO2	S	S	S	S	S	M	M	S	S	M	S	S
CO3	M	M	M	M	S	M	M	S	M	M	S	S
CO4	S	M	M	M	S	M	M	S	S	M	S	S
CO5	S	S	S	M	S	S	M	S	S	S	M	S

Prepared By	Ms.JannathulFirthoes
Verified By	Dr.M.Muralidharan

Course Code & Title	OEC-I-DATA MINING AND DATA WAREHOUSING			
21MCA214Ob	**Semester III**		**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K 6:** Create			
Learning Objectives	**The course aims to** ➢ introduce the basic concepts of data mining and preprocessing techniques ➢ imbibe the knowledge on Association Rule Mining ➢ elaborate the importance of classification and prediction techniques through various methods ➢ introduce the concepts and importance of basic clustering techniques ➢ introduce the concepts of warehousing, architecture and multidimensional data model			

PREREQUISITES:
Data Structures and Algorithms
Data Base System

UNIT -- I:
DATA MINING & DATA PREPROCESSING: Introduction to KDD process – Knowledge Discovery from Databases - Data Preprocessing: An Overview – Data Cleaning – Data Integration – Data Reduction –Data Transformation and Data Discretization.   **[10 Hrs]**
Self- Study Portion: Data Discretization.

UNIT – II:
ASSOCIATION RULE MINING: Mining Frequent Patterns: Basic concepts **-** Frequent Itemset Mining Methods: Apriori Algorithm: Finding Frequent Itemsets using Candidate Generation- Generating Association Rules from Frequent Itemsets- A Pattern-Growth Approach for Mining Frequent Itemset.   **[10Hrs]**

UNIT – III:
CLASSIFICATION: Basic Concepts - Decision Tree Induction -Bayes Classification Methods- Rule-based Classification - Model Evaluation and Selection- Techniques to Improve Classification Accuracy.   **[13 Hrs]**

Self- Study Portion: Techniques to Improve Classification Accuracy.

UNIT – IV:
CLUSTERING: Cluster Analysis - Partitioning Methods: k-means and k-medoids-Hierarchical methods: Agglomerative and Divisive Hierarchical Clustering - BIRCH – Density-Based Methods: DBSCAN – Grid-Based Methods: STING - Evaluation of Clustering.
Self -Study Portion: Evaluation of Clustering. **[15 Hrs]**

UNIT – V:
DATA WAREHOUSE: Data Warehousing - Operational Database Systems vs. Data Warehouses - Data Warehouse Multitier Architecture - Data Warehouse Models: Enterprise Warehouse, Data Mart and Virtual Warehouse - Multidimensional Data Model: Data Cube, Stars, Snowflakes, and Fact Constellations – Online Analytical Processing: Introduction - OLAP Operations. **[12 Hrs]**

Book for Study:
   1. Jiawei Han and MichelineKamber, "***Data Mining Concepts and Techniques***", Third Edition, Elsevier, Reprinted 2008.

Books for Reference:
   1. K.P. Soman, ShyamDiwakar and V. Ajay, ***"Insight into Data mining Theory and Practice"***, Easter Economy Edition, Prentice Hall of India, 2006.
   2. G. K. Gupta, ***"Introduction to Data Mining with Case Studies"***, Easter Economy edition, Prentice Hall of In*d*ia, 2006.
   3. A Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ***"Introduction to Data Mining",*** Pearson Education, 2007

Web References:
   1. https://www.tutorialspoint.com/data_mining/
   2. https://www.hackerearth.com/blog/machine-learning/beginners-tutorial-apriori-algorithm-data-mining-r-implementation/
   3. https://t4tutorials.com/apriori-algorithm-in-data-mining-with-examples/
   4. https://data-flair.training/blogs/classification-algorithms/
   5. https://www.youtube.com/watch?v=9v4Wnz27c20
   6. https://www.youtube.com/watch?v=E24Wxj7UmaA
   7. https://www.slideshare.net/2cdude/data-warehousing-3292359

Course Outcome:

On the successful completion of the course, students will be able to

CO1:	preprocess the data using various preprocessing techniques	**K3**
CO2:	generate association rules using Apriori and FP-growth algorithms	**K6**
CO3:	predict the class label of a given tuple using the classification techniques	**K2**
CO4:	group the data using the basic clustering techniques	**K3**
CO5:	summarize the concepts of warehouse, its architecture and multidimensional data models.	**K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	M	M	M	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	M	M	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	M	M	M	M	M	S	S	M	M	S

Prepared By	Ms.P. Kalpana
Verified By	Dr.M.Muralidharan

Course Code & Title	**OEC-I-SCRIPTING LANGUAGES(Java Script, JQUERY)**		
21MCA214Oc	**Semester II**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ learn the client side scripting functionalities ➢ give exposure to Java Script library ➢ know the functionalities ofopen source web based framework ➢ imbibe knowledge in cross platform run time environment ➢ familiar with front end framework bootstrap		

PREREQUISITES:
 None

UNIT --I:
HTML: Basic HTML, The Document body, Text, Hyperlinks, Adding more formatting, Lists, Tables, Using colors and images, Images, Multimedia objects, Frames, Forms-towards interactivity, Cascading Style Sheets: Introduction, Using styles: Simple examples, Defining your own styles, Properties and values in styles. [**12 Hours]**

UNIT --II:
Client Side Scripting : JavaScript: JavaScript—The basics, Variables, String manipulation, Mathematical functions, Statements, Operators, Arrays, Functions- Data and objects in java script, Regular expressions, Exception Handling, Built in objects, Events.

[10 Hrs]

UNIT -- III:
Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, writing to a different frame, Rollover buttons, Moving images, multiple pages in a single download, A text-only menu system, Floating logos. **[12 Hrs]**

UNIT -- IV:

JQuery: Introduction to JQuery - Element Getters and Setters: HTML Attributes - CSS Attributes - CSS Classes - HTML Form Values - Altering Document Structure - Events - Animated Effects.   **[14 Hrs]**

UNIT -- V:

Bootstrap: Introduction – Bootstrap with CSS: Grid System – CSS overview – Typography – code – tables- forms- buttons- images – Bootstrap Layout Components: Drop downs- button groups- button drop downs- input groups – navigation elements- pagination- alerts – progress bar – media objects.   **[12 Hrs]**

Books for Study

1. Chris Bates, *"Web Programming Building Internet Applications"*, Third Edition, Wiley, 2007, ISBN-*10*: 0470017759
   ISBN: 978-0-470-34472-9.
2. David Flanagan, "*jQuery Pocket Reference*", O'Reilly Media, Inc., ISBN: 978-1-449-39722-7
3. Material will be provided by the Department for UNITS V

Books for Reference
   1. Alexei White, "*JavaScript Programmer's Reference*", Wiley Publishing, Inc,

Web references:
1. www.tutorialspoint.com/nodejs
2. www.w3schools.com

Course Outcomes:
   On the successful completion of the course, students will be able to

CO1: describe Java Script functionalities in creating web page   **K2**
CO2: Develop pages using JQuery   **K3**
CO3: illustrate UI design and maintains it in database   **K2**
CO4: employ Nodjs to create server side application   **K4**
CO5: Design effective UIs   **K4**

<u>**Mapping of COs with POs&PSOs:**</u>

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	M	S	S
CO4	S	M	S	M	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Prepared By	Mrs K PonevelAzhagu Lakshmi &Mr.P.Velmurugan
Verified By	Dr.M.Muralidharan

Course code	Debugging	Semester	Hrs	Cre
21MCA2D		**II**	**2**	**2**

Objectives:

The main objectives of this course is to train the students to locate or identify the bugs in the program.

Methodology:

Training will be provided to the students to identify the following types of errors.

Compiler Errors

Linker Error

Runtime Error

Logical Error

Compiler Errors:

Every language has got set of rules. If you make a mistake while using the language, then it is called **syntax error/compilererror**

Linker Error

The *linker* is a program that links object files and libraries together to create an executable program. The linker matches up functions and global variables used in object files to their definitions in other object files. The linker uses the *name* (often the term *symbol* is used) of the function or global variable to perform the match.

Run time Error

Runtime Errors: Exceptions due to insufficient memory and Segmentation fault, stack over flow, etc. A runtime error occurs when the program is running and usually results in the program aborting. There are several types of runtime errors:

Illegal memory access

Division by zero

Logical Error /Semantic Error

You are writing program to solve a problem. So, there is a set of input and you expect some output. If there is difference between the expected o/p and actual o/p, then your program logic is wrong. This is called **Logical Error.**

Language to be used: C Multiple training sessions shall be conducted to identify errors in C program snippets.

Duration: 10 weeks:

Evaluation:

Test1 : 25 questions - 25 marks (5th week)
Test 2 : 25 questions - 25 marks (10th week)
Tests will be conducted and evaluated internally; passing minimum 50 %
Failed candidates can reappear in the 11th or 12th week

Programming concepts
Unit – I
Basic concepts – Data types - Type casting - Input and Output statements – escape sequences   -Control strings - User defined data types : enum - Usage of operators: unary, binary and ternary - Control structures - Dealing with logical values   **[week 01 – 02]**
Unit – II
Functions - Call by value and call by reference - Usage of string functions and mathematical functions – Usage of static, auto, register and extern. **[week 03 – 04]**
Unit – III
Arrays - Usage of character arrays- recursion - Usage of structures and union
[week 05 – 06]
Unit – IV
Pointers - constant pointer and pointer to a constant- usage of far pointers - usage of character pointers**[week 07 – 08]**
Unit – V
Macros – preprocessor directives–memory allocation and de allocation functions: malloc, realloc, calloc, free**[week 09 – 010]**
Books for reference
C: Test Your Aptitude By Venugopal & Chandrakan
Test Ur C Skills By Yashavant Kanetkar
Programming with ANSI and Turbo C By Kamthane
Working with C By Yashavant KanetkarUnderstanding Pointers in C By Yashavant Kanetkar
Interview Questions in C Programming - Yashavant Kanetkar & Asang Dani
C Under DOS Test – Vijay Mukhi's Series
Web references:
http://www.faq-c.com
http://www.techpreparation.com/aptitute-questions/c-aptitude-questions1.htm
http://www.softinterview.com

Course Code & Title	CC-XIV-MOBILE APPLICATION DEVELOPMENT				
21MCA315	**Semester III**		**Credits: 4**		**Hours: 5**
Cognitive Level	**K2:** Understand **K3:** Apply **K 4:** Analyze				
Learning Objectives	**The course aims to** ➢ understand the Android OS and application architecture and its installation. ➢ build user interfaces with Layout, Form widgets and enhance the application with fragments. ➢ present menus via the Android action bar and handle menu selections. ➢ store application data on the mobile device, in internal or external storage locations with an exposure about databases and content providers. ➢ understand the principles of graphics, messaging, sound and video and give an exposure to generating signed APK and Publishing it.				

PREREQUISITIES

Scripting Languages
Programming in JAVA
Data base System

UNIT – I:

Android Introduction: An Open Platform for Mobile Development – Native Android applications – Android SDK features – Evolution- development of android for mobile – Development framework. **[12 Hrs]**

UNIT – II:

Android application development: installation – Creating application – Types of Applications – Android development tools. Creating Applications and activities: Application Manifest file – Manifest editor – Externalizing the resources – Android application life cycle – Android application class- android activities. **[12 Hrs]**

UNIT – III:

Building user interfaces: Fundamental UI Design – Layouts – Fragments – Widget Tool box – Creating new views – introducing adapters. **[17 Hrs]**

UNIT – IV

Databases and content providers: Android databases – working with SQLite databases – Creating content providers – Native android content providers - Introducing the   Action Bar – Creating and Using Menus and Action bar action items – Introducing   Dialogs – Introducing notifications.   **[17 Hrs]**

UNIT – V

 Supporting and optimizing for different screen sizes- creating scalable graphic assets - Working with animations-Audio, Video and using the Camera - introducing SMS and MMS – signing and publishing application.   **[17 Hrs]**

Books for Study

1. Reto Meier, **"*Professional Android 4 Application Development*"**, WROX   Publication – Wiley – India, 2012

Books for Reference:

1. Pradeep Kothari &Kogent Learning Solutions Inc, **"*Android Application   Development Black Book*"**, Dreamtech Press, Edition 2014, ISBN: 978 – 93 – 5119 – 409 –5.
2. W.FrankAbleson, RobiSen, Chris King, C.Enrique Ortiz, **"*Android in Action"*, Manning Publications Co,Third Edition, ISBN 9781617290508
3. Lauren Darcey, Shane Conder, **"*SAMS Teach Yourself Android Application Development in 24 Hours*"**, Second edition.

Web References:

1. https://developer.android.com/guide/
2. https://studytonight.com/android
3. Toy tube Play list: android tutorial for beginner's slidenered.

Course Outcomes:
On Completion of the course the student will be able to

CO1: understand the Application Architecture, lifecycle, configuration files, etc.	**K2**
CO2:illustrate various application components like Activities, Fragments, and Content Provider etc.	**K3**
CO3: design the User Interface.	**K3**
CO4:write simple mobile applications.	**K4**
CO5: generate the APK and Publishing it on Android Market.	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	M	M	M	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	M	M	M	S	S	M	S	S	M	S	S
CO4	S	S	M	M	S	M	M	S	S	S	S	S
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Prepared By	Mr P. Velmurugan
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XV- -Aɪ ᴀɴᴅ Mᴀᴄʜɪɴᴇ ʟᴇᴀʀɴɪɴɢ		
21MCA316	Semester : III	Credits : 4	Hrs:5
Cognitive Level	K1 – Remember K2 – Understand		
Learning Objectives	This Course aims to ▪ study the concepts of Artificial Intelligence ▪ understand the basics of machine learning ▪ describe Neural Networks and Genetic Algorithms ▪ illustrate Bayseian and Computational learning		

Uɴɪᴛ - I

Introduction to AI and Production Systems: Introduction to AI-Problem formulation, Problem Definition –Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics- Specialized production system-Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions –Hill Climbing –Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms. **(15 hrs)**

Uɴɪᴛ-II

Representation of knowledge: Game playing- Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic- Structured representation of knowledge. **(10 hrs)**

Uɴɪᴛ –III

Introduction : Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search. **(15 hrs)**

Uɴɪᴛ – IV

Neural Networks And Genetic Algorithms: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evalution and Learning. **(15 hrs)**

UNIT -V

Bayesian and Computational Learning : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network –EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model. **(20hrs)**

Book for Study:

1. Kevin Night and Elaine Rich, Nair B " *Artificial Intelligence(SIE)",* Mc Graw Hill-2008(Unit I,II)

2. Tom M. Mitchell, "**Machine Learning**", First Edition, McGraw Hill Education (India) Private Limited, (1 May 2013) ISBN-10: 1259096955 , ISBN-13: 978-1259096952

Books for Reference:

1. Ethem Alpaydin, *"Introduction to Machine Learning (Adaptive Computation and Machine Learning)",* The MIT Press 2004

2. T. Hastie, R. Tibshirani, J. H. Friedman, *"The Elements of Statistical Learning",* Springer; 1 edition, 2001

3. Deepak Khemani" *Artificial Intelligence", Tata* Mc Graw Hill-2013

Web Reference:

1. https://www.cs.ubbcluj.ro/~gabis/ml/ml-books/McGrawHill%20-20Machine%20Learning%20-Tom%20Mitchell.pdf

2. https://www.python-course.eu/machine_learning.php

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: solve the real life problems using AI techniques.   K1

CO2: identify appropriate AI methods to develop knowledge based solution.   K2

CO3: identify problems, through the concept of learning methods.   K1

CO4: apply various neural networks algorithms to real life problems.   K2

CO5: apply genetic algorithms for research problems.   K1

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**
CO1	S	S	M	M	N	S	M	M	N	M
CO2	M	S	S	M	N	M	M	S	N	S
CO3	S	W	S	M	N	M	S	M	N	M
CO4	S	S	M	S	N	W	S	M	N	S
CO5	S	M	M	M	N	S	S	S	N	S

S-Strongly Correlating   M-Moderately Correlating
W-Weakly Correlating   N-No Correlation

Prepared by	Dr.K.Sridevi
Verified by	Dr.M.Muralidharan

Course Code & Title	**CC-XVI-INTERNET Of THINGS**			
21MCA317	**Semester III**		**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze			
Learning Objectives	**The course aims to** ➢ understand the fundamentals of Internet of Things ➢ provide IOT and related Internet technologies ➢ know about heterogeneous objects, applications and services ➢ give up-to-date knowledge about cloud services with IoT ➢ introduce and apply the concept of Internet of Things in the real world scenario			

PREREQUISITIES:

Digital Design and Architecture

Computer Networks

UNIT – I:

Introduction - Putting the Internet of Things forward to the Next Level - Internet of Things Strategic Research and Innovation Agenda : Internet of Things Vision - Internet of Things Strategic Research and Innovation Directions - IoT Smart X Applications.　　　[**12 Hrs**]

UNIT–II:

Internet of Things and Related Future Internet Technologies - Network and Communications - Processes - Data Management - Security, Privacy and Trust - Device Level Energy Issues - IoT Related Standardization - IoT Protocols Convergence.　　　[**12 Hrs**]

UNIT–III:

Scalable Integration Framework for Heterogeneous Smart Objects, Applications and Services : IPV6 Potential - IoT6 - IPV6 vsIoT - Adapting IPV6 to IoT Requirements - IoT6 Architecture - DigCovery - IoT6 Integration with the Cloud and EPICS – Enabling Heterogeneous Integration - IoT6 Smart Office Use Case - Scalability Perceptive.　　　[**12 Hrs**]

UNIT– IV:

Insights on Federated Cloud Service Management and the IoT : Federated Cloud Service Management - Federated Management Service Life Cycle - Self Management Life Cycle - Self Organizing Cloud Architecture - Horizontal Platform.　　　[**12 Hrs**]

UNIT – V:

Internet of Things Applications: OpenIoT - iCORE - Compose. **[12 Hrs]**

Book for Study:

1. VidiuVermesan and Peter Friess,*"Internet of Things - From Research Innovation to Market Deployment"*, River Publishers, 2014.

Book for Reference:

1. Adrian McEwen and Hakim Cassimally, *"Designing the Internet of Things"*, John Wiley and Sons, Ltd, 2014.

Course Outcomes:

On completion of the course the student will be able to

CO1: analyze the basics of IoT	**K4**
CO2: interpret web services to access/control IoT devices	**K2**
CO3: apply an IoTin heterogeneous environment	**K3**
CO4: relate cloud services and IoT	**K2**
CO5: Analyze applications of IoT in real time scenario	**K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	M	M	M	M	W	M	S	S	M	M	S
CO2	S	S	M	M	S	M	S	S	S	M	S	S
CO3	S	S	S	S	S	M	S	S	S	M	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	S	S	M	M	S	S	M	S	S

Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XVII-COMPILER DESIGN		
21MCA318	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand translators and its functions with phases of a compiler ➢ inculcate thorough knowledge in Parsers ➢ categorize intermediate code generation techniques ➢ give exposure in data structures for symbol table and error handler ➢ describe different methods to generate object code.		

PREREQUISITES

Operating System
Data Structures and Algorithms
Programming in JAVA

UNIT – I:

Introduction to Compilers –Compilers and translators – assembly language – macros – structure of compiler – Compiler writing tools – bootstrapping. Lexical analysis – role of lexical analyzer – regular expression – finite automata – implementation of lexical analyzer – context free grammars – derivation and parse trees.   **[12 Hrs]**

Self- Study: Compiler writing tools, implementation of simple lexical analyzer in C

UNIT – II:

Parsers – shift reduce parsing – operator precedence parsing – top down parsing –predictive parsers – simple precedence parser – LR parsers – constructing SLR parsing tables – constructing canonical LR parsing table – constructing LALR parsing tables –using ambiguous grammars.   **[14 Hrs]**

UNIT – III:

Syntax directed translation schemes – implementation of syntax directed translation schemes – intermediate code– postfix notation – parse trees and syntax trees – three address code, quadruples and tuples – translation of assignment statements – Boolean expression – postfix translation.   **[12 Hrs]**

UNIT – IV:

Symbol table – the contents of a symbol table – data structures for symbol tables – representing scope information – Errors – lexical phase errors – syntactic phase errors– Semantic errors. **[10 Hrs]**

UNIT –V:

Code optimization – principle sources of optimization – loop optimization – machine dependent optimization – DAG representation in basic blocks. Code generation –problems in code generation – a simple code generator – register allocations and assignment – Code generation from DAG's – Peep hole optimization. [**12 Hrs]**

Self- study: assembly language instructions.

Book for Study:
   1. A.V.Aho and J D Ullman, "***The Principles of Compiler Design***" ,Narosa Publishing House, 1987, ISBN: 81-85015-61-9.(Chapters: 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 15)

Books for Reference:
   1. Alfred Aho, Ravi Sethi, Jeffy D. Ullman, "***Compilers – Principles, Techniques and Tools***", Pearson Education Asia, 2003
   2. Dick Grune, Kes van Reeuwijk, Henri E.bal, Ceriel J H Jacobs, KoenLangendoen, ***"Modern Compiler Design"***, Second edition.
   3.

Web references
   1. www.nptel.ac.in/courses/106108052/
   2. www.nptel.ac.in/downloads
   3. www.tutorialspoint.com/compiler_design/
   4. www.geeksforgeeks.org/compiler-design-tutorials/

Course Outcomes:

On completion of the Course, the student should be able to

CO1: classify various types of translators and its functions and identify phases
of compiler **K2**

CO2: design lexical analyzer and identify the similarities and differences
among different parsing techniques **K3**

CO3: formulate the different representation of intermediate code **K3**

CO4: utilize parsers and symbol tables to identify errors from different phases **K4**

CO5: explain the conversion of optimized code to object code. **K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	M	M	M	M	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	M	M	M	S	S	M	M	S
CO4	S	M	W	W	M	M	M	S	S	M	S	S
CO5	S	S	M	M	M	S	M	S	S	M	M	S

Prepared By	Ms K.Ponvel Azhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XVIII-MOBILE APPLICATION DEVELOPMENT LAB		
21MCA319L	**Semester III**	**Credits: 2**	**Hours: 3**
Cognitive Level	**K3: Apply** **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ apply layouts, views and events to solve simple problems ➢ design and develop applications using SQlite ➢ develop applications using multimedia objects		

PREREQUISITIES

Scripting Languages
Programming in JAVA
Data base System
Web Design and Development

Solve Problems using

- Layouts
- Views
- Events
- Preferences
- Notification
- Programs using SQlite
- Audio and Video Applications
- Messaging Applications
- Camera
- Action Bar
- Alert Dialogs

Course Outcomes:
On Completion of the course the student will be able to

CO1: design User Interface using various components   **K4**
CO2: implement applications with database   **K3**
CO3: write applications with multimedia objects   **K3**
CO4: build the given simple applications with action and alert dialogs   **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	S	M	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mr P. Velmurugan
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XIX-MACHINE LEARNING LAB		
21MCA320L	**Semester III**	**Credits: 2**	**Hours: 3**
Cognitive Level	**K3: Apply** **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ Make use of Data sets in implementing the machine learning algorithms. ➢ Impart knowledge to implement the machine learning concepts and algorithms.		

Implement the algorithms using relevant data set and visualize the outputs:

- FIND – S

- Candidate Elimination

- Decision Tree Learning

- Bayesian Classifier

- Navie bayes Classifier

- K- Nearest Neighbour

- Regression

Course Code & Title	EC-II-Block Chain Technology		
21MCA322Ea	Semester III	Credits: 4	Hours: 4
Learning Objecives	The course aims to ➢ Learn the basics of Blockchain ➢ impart knowledge in bitcoin and crypto currency ➢ introduce various algorithms for distributed work. ➢ familiar with applications of block chain.		

UNIT – I

INTRODUCTION TO BLOCKCHAIN

Blockchain- Public Ledgers, Blockchain as Public Ledgers -Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain - Cryptocurrency to Blockchain 2.0 - Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree.

[12 hours]

UNIT – II

BITCOIN AND CRYPTOCURRENCY

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network.   [12 hours]

UNIT – III

BITCOIN CONSENSUS

 Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for permissioned blockchain-

Distributed consensus in closed environment-Paxos.   [12 hours]

UNIT – IV

DISTRIBUTED CONSENSUS

RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance.

UNIT – V

BLOCKCHAIN APPLICATIONS

Internet of Things-Medical Record Management System-Blockchain in Government and Blockchain Security-Blockchain Use Cases –Finance.   [12 hours]

Books for Study

1. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Bashir, Imran,2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.   [12 hours]

Course Code & Title	EC-II -CLOUD COMPUTING		
21MCA322Eb	Semester III	Credits: 4	Hours: 4
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ understand various types of clouds ➢ learn cloud computing architecture ➢ familiar with cloud computing applications ➢ learn Cloud based online tools and real time applications. ➢ recognize cloud security and its issues		

PREREQUISITIES

UNIT –I:
Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud – Features of a cloud-Infrastructure Management-Cloud Services-Challenges and Risks. Migrating into a Cloud: Approaches –Seven Step Model. Introduction- Broad Integration as a Service-Integration Methodologies- SaaS. **[18 Hrs]**

UNIT –II:
The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design – Cluster as a Service: The Logical Design – Cloud Storage : from LANs TO WANs- Technologies for Data Security in Cloud Computing . **[15 Hrs]**

UNIT –III:
Collaborating on Project Management: Understanding Project Management - Exploring Project Management Applications - Collaborating on Word Processing: How Web-Based Word Processing Works - Exploring Web-Based Word Processors - Collaborating on Spreadsheets: How Web-Based Spreadsheets Work - Exploring Web-Based Spreadsheets - Collaborating on Databases: Understanding Database Management - Exploring Web-Based Databases - Collaborating on Presentations: Preparing Presentations Online - Evaluating Web-Based Presentation Applications. **[15 Hrs]**

UNIT –IV:

Storing and Sharing Files and other online contents: Understanding Cloud Storage - Evaluating Online File-Storage and Sharing Services - Exploring Online Bookmarking Services— Sharing Digital Photographs: Exploring Online Photo- Editing Applications - Exploring Photo-Sharing Communities - Controlling it all with web based Desktops: Understanding Web-Based Desktops - Evaluating Web Based Desktops - Collaborating via web based Communication Tools: Evaluating Web Mail Services - Evaluating Instant Messaging Services - Evaluating Web Conferencing Tools.   **[15 Hrs]**

UNIT –V:

Grid and Cloud- HPC in the Cloud: Performance related Issues –Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk-Identity- The Cloud, Digital Identity and Data Security – Content Level Security: Pros and Cons-Legal Issues in Cloud Computing–Data Privacy and Security Issues-Cloud Contracting models.

                                                          [12 Hrs]

Books for Study:

1. RajkumarBuyya, James   Broberg, and AndrzejGoscinski. ***"Cloud Computing Principles and Paradigms"*** 2011 .(UNIT I, II, V), ISBN: 978-0-470-88799-8
2. Michael Miller***" Cloud Computing: Web Based Applications that change the way You work and collaborate online***, Pearson Education, 2009 edition.(UNIT III,IV) ISBN: 9788131725337

Book for Reference:

1. George Reese" ***Cloud Application Architectures",*** Shroff/O' Reilly,2009,ISBN: 8184047142

Web References:

1. http://calvary.cponus.com/cp/wp-content/uploads/2013/05/ CloudComputingPrinciplesandParadigmsChapter3ENRICHINGTHEINTE.pdf
2. http://chettinadtech.ac.in/storage/13-01-21/13-01-21-08-33-12-1373-mahendra.pdf

Course Outcomes:
At the end of the course the student will be able to:

CO1:recognise various types of clouds service and deployment models	**K1**
CO2: acquire cloud computing architecture	**K2**
CO3: identify and analyzebasic cloud collaborating applications	**K2**
CO4: identify and Analyzeadvanced cloud collaborating applications	**K4**
CO5: summarize Cloud security and its importance to real time applications	**K3**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	S	S	S	M	S	S	M	S	S
CO2	S	S	S	M	S	S	M	S	S	M	S	S
CO3	S	S	S	S	S	M	M	S	S	M	S	S
CO4	S	S	S	S	S	M	M	S	S	M	S	S
CO5	S	M	S	S	S	M	M	S	S	M	S	S

Prepared By	DrD.Jayachitra
Verified By	Dr.M.Muralidharan

Course Code & Title	**EC-II-DIGITAL IMAGE PROCESSING**		
21MCA322Ec	**Semester III**	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ study the components and elements of digital image ➢ impart knowledge in various domain for image enhancement ➢ introduce the concepts filtering images ➢ familiar with different compression techniques. ➢ identify the methods of representing images and recognize them.		

PREREQUISITIES
   Computer Graphics

UNIT – I
DIGITAL IMAGE FUNDAMENTALS: Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels color models.   **[15 Hrs]**

UNIT – II
IMAGE ENHANCEMENT: Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening; Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.   **[15 Hrs]**

UNIT – III
IMAGE RESTORATION AND SEGMENTATION : Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation Morphological processing erosion and dilation.   **[15 Hrs]**

UNIT – IV
WAVELETS AND IMAGE COMPRESSION: Wavelets – Sub band coding Multire solution

expansions Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.   **[15 Hrs]**

UNIT – V
IMAGE REPRESENTATION AND RECOGNITION : Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments Regional Descriptors – Topological feature, Texture Patterns and Pattern classes Recognition based on matching.   **[15 Hrs]**

Books for Study
1.   Rafael C. Gonzales, Richard E. Woods, "*Digital Image Processing*", Third Edition, Pearson Education, 2010.

Books for Reference
1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "*Digital Image Processing Using MATLAB*", Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2. Anil Jain K. "*Fundamentals of Digital Image Processing*", PHI Learning Pvt. Ltd., 2011.
3. William K Pratt, "*Digital Image Processing*", John Willey, 2002

Course Outcomes:
On the successful completion of the course, students will be able to
CO1: explain the fundamentals of digital image   **K2**
CO2: apply various methods and techniques to enhance the image   **K3**
CO3: classify the techniques for filtering and segmentation   **K4**
CO4: classify compression, decompression techniques and standards.   **K4**

CO5: illustrate image representation and pattern matching   **K2**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	M	S	S
CO4	S	S	M	M	S	M	S	S	S	M	S	S
CO5	S	M	M	M	S	M	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course	Programming Skill Development	Semester	Hrs	Cre
21MCA3PSD		**III**		**2**

Objectives:
The course aims to
 train the students to create the logics and write the programs by their own
Course outcomes:
On completion the course the students will be able to
CO1: Interpret any problem and develop programs
CO2:analyze real time problems and solve it

Languages Used: C/JAVA/ Python

Evaluation:
Test I: 25 Marks
Teat II: 25 Marks
Total: 50 Marks

Concepts	Languages
Decision Making	
Loops	
Functions	
Data Structures	C/JAVA/PYTHON
Arrays & Pointers	
Files	
OOPs Concepts	JAVA/PYTHON

 -

Course Code & Title	EC-III-Big Data Analytics		
21MCA423Ea	**Semester : IV**	**Credits : 4**	**Hrs:5**
Cognitive Level	**K 2 –** Understand **K 3 –** Apply **K 4 –** Analyze **K 6 –** Create		
Learning Objectives	**This Course aims to** ▪ illustrate the evolution and foundations of Big data ▪ classify the methods of streams ▪ learn Hadoop, map reduce and its environment ▪ justify features and working of map reduces. ▪ build Hadoop cluster and extend the framework of Big Data analytics		

UNIT- I

The Fundamentals of Big Data: The Evolution of Data Management-Understanding the Waves of Managing Data-Defining Big Data-Big Data Management Architecture-Traditional and advanced analytics. **Big Data Types:** Defining Structured Data-Defining Unstructured Data. **Technology Foundations of Bigdata:** Big data Stack (technology Components) – Big data Analytics- Big data Applications. **Virtualization and Distributed Computing:** Understanding the basics of virtualization- importance of virtualization to Big Data**.**   **(15 hrs)**

UNIT -II

Mining Data Streams : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window. **Self Study: Real time Analytics Platform (RTAP) Applications**. **(15 hrs)**

UNIT- III

Hadoop: History of Hadoop- Components of Hadoop –Map Reduce: Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- The Hadoop Distributed File System :Design of HDFS-HDFS Concepts-The command Line Interface- Java interfaces**.   Self Study: Installation of Hadoop** , **Hadoop eco system tools**   **(15 hrs)**

UNIT- IV

Map Reduce: Developing Map Reduce application: Setting up the development environment- Writing a unit test with MRTUnit- Running Locally on Test Data. How Map Reduce Works: Anatomy of a Map Reduce Job run-Shuffle and Sort – Map Reduce Types and Formats- Map Reduce Features: Counters-Sorting-Joins. **Self Study: Developing MR programs and execution** **(15 hrs)**

UNIT –V

Hadoop Environment: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security.
FRAMEWORKS: Pig: Installing and Running Pig- Data processing operators in Pig – Hive: Installing Hive- Hive services –Hive Client- HiveQL – Querying Data in Hive. **Self Study: Basics of Pig & Hive** **(15 hrs)**

Books for Study:

1. Judith Hurwitz, Alan Nugent, Dr.Fern Halper and Marcia Kaufman,"**Big data for dummies"**, John Wiley & Sons, Inc 2017.ISBN: 978-1-118-50422-2. UNIT I: Chapters 1,2,4 & 5
2. AnandRajaraman and Jeffrey David Ullman, "*Mining of Massive Datasets*", Cambridge University Press, 2012.UNIT-II:Chapter 4(4.1-4.7)
3. Tom White "*Hadoop: The Definitive Guide*" Fourth Edition, O'reilly Media, 2015.**UNIT III**: Chapter I,II, III **UNIT IV**:VI,VII, VIII, IX **UNIT V**: Chapters 10,11,16&17

Books for Reference:

1. Michael Berthold, David J. Hand, "*Intelligent Data Analysis*", Springer, 2007.
2. Alan Gates, *"Programming Pig"*, O'reilly Media, Second Edition 2018
3. Jason Ruthberglen,Dean Wampler & Edward Capriolo,*"Programming Hive"*, O'reilly Media, Fifth Edition 2018

Web Reference:

1. https://youtu.be/TG48mumSlaw: Flajolet Martin Algorithm
2. https://youtu.be/JZDNBfnYwe4: AMS algorithm
3. https://pig.apache.rg/docs/latest/start.html
4. Hadoop.adache.org

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: analyze evolution and technologies requirement of big data		**K4**
CO2: predict mining data from data sets		**K3**
CO3: outline Components of Hadoop and Mapreduce functions and its environment		**K3**
CO4: explain different working principles of Mapreduce		**K2**
CO5: formulate Hadoop cluster and select appropriate tool		**K6**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**
CO1	S	M	S	M	N	W	M	M	N	S
CO2	M	M	S	S	N	M	M	S	N	S
CO3	M	W	S	M	N	M	S	M	N	S
CO4	W	S	M	S	N	W	S	M	N	S
CO5	S	S	M	M	S	M	S	M	N	M

S-Strongly Correlating   M-Moderately Correlating
W-Weakly Correlating   N-No Correlation

Prepared by	Mrs.K.PonvelAzhagu Lakshmi
Verified by	Dr.M.Muralidharan

Course Code & Title	EC-III-Distributed Programming using .Net		
21MCA423Eb	**Semester IV**	**Credits: 4**	**Hours: 5**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➤ understand the architecture and frame work of .NET ➤ familiar with the concepts of C# ➤ impart knowledge in ASP .NET and Ado .NET ➤ give up-to-date knowledge in different controls and tools ➤ give exposure to database connectivity		

PREREQUISITIES

Programming in JAVA

Data Base System

UNIT – I:

The NET Architecture: The vision and goals of . NET – The building blocks of NET – An Overview of. NET framework: The NET Evolution – Design goals of the NET frame work – The NET framework Architecture – An Overview of .NET application. **[12 Hrs]**

UNIT – II:

The creation of C# - An overview of C# - Data types, Literals, and Variables – Operators – Control Statements – Introducing Classes and Objects – Arrays and Strings – Methods - Operator Overloading. **[15 Hrs]**

UNIT – III:

Indexes and Properties – Inheritance – Interfaces , Structures, Enumerations – Exception Handling – Delegates, Events, Lambda Expressions – Namespaces, Preprocessor, and Assemblies. **[16 Hrs]**

UNIT – IV:

ASP .NET Overview of ASP .Net Frame work – Overview of CLR – Class Library –Overview of ASP .Net Control – Understanding of HTML Controls – Study of Standard Controls – Validation Controls – Rich Controls – Adding controls to forms –Handling events and using various Tools. **[16 Hrs]**

UNIT – V:
ADO .NET Fundamentals – Component Object Model – ODBC – OLEDB and SQL Connected mode – Disconnected Mode – Data Set – Data Reader – Data Access Control – Grid View Control – Other controls. **[16 Hrs]**

Books for Study:
1. Stephen C. Perry, AtulKahate, Stephen Walther, Joseph Mayo,” ***Essentials of .Net and Related Technologies: With a focus on C# , XML, ASP .NET and ADO .NET***”, First Edition, Pearson Education., 2009.
2. Herbert Schildt, “**The Complete Reference C# 4.0”,** 1st edition (1 July 2017), McGraw Hill Education.
3. Kevin Hoffman & Jeff Gabriel, “***Professional .NET Framework***”, Shroff Publishers and Distributors Pvt. Ltd.

Web References:
1. https://memberfiles.freewebs.com/02/83/78118302/documents/McGraw.Hill.CSharp.4.0.The.Complete.Reference.Apr.2010.pdf
2. https://jignesh272.files.wordpress.com/2011/09/object-oriented-programming-using-c-sharp.pdf

Course Outcomes:
On completion of the course the student will be able to

CO1: utilize the features of Dot Net Framework along with the features of C#   **K2**
CO2: apply ASP.NET todesign web applications   **K3**
CO3: use ASP.NET controls in web applications.   **K2**
CO4: debug and deploy ASP.NET web applications   **K4**
CO5: create database driven ASP.NET web applications and web services   **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S	S	S
CO4	S	M	M	S	S	M	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mr C. Yogaraj
Verified By	Dr.M.Muralidharan

Course Code & Title	EC-III-Exploratory Data Analysis		
21MCA423Ec	Semester IV	Credits: 4	Hours: 5

UNIT – I

Introduction: Introduction to Data Science, Exploratory Data Analysis and Data Science Process. **Essential Python Libraries:** NumPy, pandas, matplotlib, SciPy, scikit-learn stats models. **Introduction to pandas Data Structures**: Series – DataFrame - Index Objects. **Essential Functionality:** Re indexing - Dropping entries from an axis - Indexing, selection, and filtering - Arithmetic and data alignment - Function application and mapping - Sorting and ranking - Axis indexes with duplicate values. **Handling Missing Data:** Filtering Out Missing Data - Filling in Missing Data

UNIT – II

Types of data: Numerical data - Discrete data - Continuous data - Categorical data - Ordinal data. **Descriptive Statistics: Mean, median, and mode:** Mean - Median – Mode. **Using mean, median, and mode in Python:** Calculating mean using the NumPy package - Calculating median using the NumPy package - Calculating mode using the SciPy package. **Standard deviation and variance:** Variance - Standard deviation - Population variance versus sample variance - Analyzing standard deviation and variance on a histogram - Using Python to compute standard deviation and variance

UNIT –III

Plotting and Visualization: Introduction to matplotlib - Generating multiple plots on one graph - Saving graphs as images - Adjusting the axes - Adding a grid - Changing line types and colors - Labeling axes and adding a legend - Generating pie charts - Generating bar charts - Generating scatter plots - Generating histograms - Generating box-and-whisker plots..

UNIT –IV

Graph plotting using seaborn library: Introduction - Importing datasets and Libraries - **Distribution Plots:** Joint Distribution Plots - Density Plots **-** Bar Plot - Scatter Plot - Boxplot

UNIT –V

Predictive Analysis: Classification: Naïve Bayesian Classifier. **Clustering Analysis:** k-means

Reference Books
1. Wes McKinney, "Python for Data Analysis", O'reilly publisher, 2013, ISBN: 978-1-449-31979-3
2. Frank Kane, "Hands – On Data Science and Python Machine Learning", Packt Publishing, 2017, ISBN 978-1-78728-074-8

Web References:
1. https://www.analyticsvidhya.com
2. https://www.tutorialspoint.com
3. https://towardsdatascience.com
4. https://www.datacamp.com

NEHRU MEMORIAL COLLEGE [AUTONOMOUS[							
MASTER OF COMPUTER APPLICATIONS							
BRIDGE COURSES 2021 -2022 (Non Computer Science)							
SEM	COU	TITLE	HRS	CRE	INT	EXT	TOT
I	21MCAN107A	CC-I-Programming in C & C++		4	25	75	100
	21MCAN107B	CC-II-Digital Computer Fundamentals		4	25	75	100
	21MCAN107CL	CC-III- C & ++ Lab		2	40	60	100
	TOTAL			10			300
II	21MCAN213A	CC-VIII-Programming in JAVA		4	25	75	100
	21MCAN213B	CC-IX-Data Communication Network		4	25	75	100
	21MCAN213CL	CC-X-JAVA Lab		2	40	60	100
	TOTAL			10			300
III	21MCAN321A	CC-XI- Web Design and Development		4	25	75	100
	21MCAN321B	CC-XII- Computer Graphics		4	25	75	100
	21MCAN321CL	CC-XIII- Web Design Lab		2	40	60	100
				10			300

Remarks:

- Bridge Course subjects are to be self-learnt and hours are not allocated in the work load.

- If any of the students of Non-Computer Science stream fail to earn part of the extra credits meant for them, then such courses may be treated as 'Arrears' and allowed to be completed in the subsequent Semester Examinations and such courses should be completed to earn the MCA qualification.

Course Code & Title	CC-I- PROGRAMMING USING C AND C++		
21MCAN107A	**Semester I**	**Credits: 4**	
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ provide the essential concepts of computer programming, and presents the syntax and semantics of the various control structures of C language. ➢ demonstrate the fundamentals of functions, storage classes and arrays. ➢ learn the importance of pointers, structures and union and Data Files and apply them to develop applications using them. ➢ learn the basic concepts of OOP paradigm. ➢ learn the friend functions, inheritance and polymorphism		

PREREQUISITE:

None

UNIT -- I:
Introduction to C Programming: Operators and Expressions – Data Input and Output – Preparing and Running a Complete C program - Control Statements: The IF-ELSE statement – Looping : The While Statement, The Do-While Statement, The For Statement – Nested Control Structures - The Switch Statement – The Break and Continue Statement – The Comma Operator – The goto Statement. **[12Hrs]**
Self-study: the break and Continue Statement – the Comma Operator – the goto Statement
UNIT -- II:
Functions: Defining a function – Accessing a Function – Function Prototypes – Passing Arguments to a Function – Recursion. **Storage Classes:** Automatic Variables – Global Variables – Static Variables. **Arrays:**Defining an Array – Processing an Array – Passing Arrays to Functions – Multidimensional Arrays – Arrays and Strings .**[12 Hrs]**

UNIT -- III:

Pointers: Fundamentals – Pointer Declarations – Passing Pointer to a Function – Pointers and One-dimensional Arrays – Operation on Pointers – Pointers and Multidimensional Arrays – Arrays of Pointers – Passing Functions to other Functions. **Structures and Unions:** Defining Structure – Processing a Structure - Unions. **Data Files:** Opening and Closing a Data File – Reading and Writing a Data File – Processing a Data File – Unformatted Data Files – Concept of Binary Files.   **[15Hrs]**

UNIT --IV:

Principles of Object Oriented Programming: Software Evolution – Procedure Oriented Programming – OOP Paradigm – Concepts, Benefits, Object Oriented Languages and Applications - Classes and Objects - Constructors and Destructors.   **[10Hrs]**

UNIT -- V:

Friend Functions – Overloading Unary and Binary Operators - **Inheritance:** Single Inheritance – Multiple Inheritances – Hierarchical, Hybrid Inheritance – Polymorphism – Constructors in Derived Classes – Virtual Base Class – Virtual Functions.   **[11Hrs]**

Books for Study:
1. Byron.S. Gottfried, "***Programming with C***", Schaum's Outlines", Second Edition, Tata McGraw-Hill, 1998. ISBN-13: 978-0070240353 ISBN-10: 0070240353.
2. E. Balagurusamy, "***Object Oriented Programming with C++***" , Sixth Edition, Tata McGraw Hill Publishing Ltd., New Delhi,2013, ISBN-10: 125902993X

Books for Reference:
1. YashawantKanetkar, "***Let Us C***", Seventh Edition, BPB Publications, 2007.
2. Herbert Schilt, "***The Complete Reference***", Ninth Edition (March 11, 2014),McGraw-Hill Osborne Media, ISBN-13: 978-0071808552

Web References:
1. https://fresh2refresh.com/c-programming/c-basic-program/
2. https://www.programiz.com/c-programming/examples
3. https://c-language.com/c-tutorial/c-basic-program/
4. https://www.studytonight.com/cpp/basics-of-cpp.php
5. https://www.youtube.com/watch?v=Rub-JsjMhWY
6. https://www.youtube.com/watch?v=ki3B8a

Course Outcomes

On the successful completion of the course, students will be able to

CO1: interpret the syntax and semantics of C language for solving **K2**
     problems

CO2: apply the concepts of functions, storage classes and array in real **K4**
     world problems

CO3: develop programs using pointers and files **K3**

CO4: describe the basic concepts of OOP paradigm **K2**

CO5: develop C++ programs for friend functions, inheritance and **K3**
     polymorphism

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	S	S	S	M	M	M	M	S	S	M	S
CO2	S	S	S	S	M	M	S	M	S	S	S	M
CO3	S	S	S	S	S	M	M	S	S	S	M	S
CO4	S	M	S	S	M	S	S	M	S	S	M	M
CO5	S	S	S	S	S	S	S	M	S	S	M	S

Strongly Correlating(S)   -   3 marks

Moderately Correlating (M)   -   2 marks

Weakly Correlating (W)   -   1 mark

No Correlation (N)   -   0 mark

Prepared By	Ms.P.Kalpana
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-II- Digital Computer Fundamentals		
21MCAN107B	**Semester I**	**Credits: 4**	
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ impart knowledge in Number Systems and Logic gates. ➢ give exposure to design circuits using Boolean algebra and Map reduction. ➢ learn the design of combinational and sequential circuits. ➢ familiar with various types of memory and its functionalities.		

UNIT I

OVERVIEW OF NUMBER SYSTEMS: **Binary Number System**: Binary to Decimal and Decimal to Binary Conversion - **Hexadecimal number System** : Hexadecimal to Decimal and Decimal to Hexadecimal conversion - Hexadecimal to Binary and Binary to Hexadecimal Conversion – **Octal Number system** : Octal to Decimal and Decimal to Octal Conversion – Complementation - **Logical Gates** : AND,OR, NOT, NAND, NOR, EX-OR and EXNOR.

[12 Hours]

UNIT II

BOOLEAN ALGEBRA AND K-MAP: Laws of Boolean algebra - DeMorgan's Theorems - Logical Expressions: Sum of Product – Product of Sum - Simplification of Boolean expression: Using Boolean algebra - Using Karnaugh Map.   [12 Hours]

UNIT III

COMBINATIONAL CIRCUITS : Binary addition: Half adder - Full adder - Four bit binary adder - BCD adder - Binary Subtraction Half subtractor- Full subtractor – Multiplexer - Demultiplexer- Decoder – Encoder. .   [12 Hours]

UNIT IV

SEQUENTIAL CIRCUITS: **Flip flops**: SR Flip flop - D Flip flop - JK Flip flop - T Flip flop. Registers - Shift Registers- Asynchronous counters - Synchronous counters - Ring counter - Design of synchronous counters.   [12 Hours]

UNIT V

 Memory Hierarchy: Memory Types - Semiconductor Random Access memories - Static RAM - Dynamic RAM - Read Only Memories: Types of ROMS. Magnetic Core Memories - Floppy Disks - Hard Disks - Optical Storage.   [12 Hours]

Books for Study:

1. Bartee T.C. (2008), "*Digital Computer Fundamentals*", Sixth Edition, McGraw Hill, New Delhi.

Books for Reference:
1. Donald P Leach, Albert Paul Malvino, GouthamSaha (2008), "*Digital Principles and Applications*", Tata McGraw Hill, 6th Edition (Special Indian Edition), New Delhi.
2. Morris Mano, M (2008), "*Digital Logic and Computer Design*", Pearson Education, New Delhi.

Course Outcomes:

 On completion of the course, the student will be able to

CO1: understand various number systems and its conversion	**K2**
CO2: design logic circuits using Boolean algebra and map reduction.	**K3**
CO3: illustrate various combinational circuits and its usage	**K2**
CO4: categorize various sequential circuits	**K4**
CO5: explain different types of memories and its working principle	**K2**

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	M	S	S	M	M	S	M	S	S	W	M	S
CO2	S	S	S	S	S	S	S	S	S	M	M	S
CO3	S	M	W	M	M	M	S	S	M	M	M	M
CO4	S	S	S	S	M	M	S	S	S	M	M	S
CO5	M	M	M	M	S	S	M	S	S	S	M	M

Prepared By	Ms K Ponvel Azhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-III-C & C++ LAB		
21MCAN107CL	**Semester I**	**Credits: 2**	**Hours:**
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➤ give exposure to basics of C & C++ from operators to control structures ➤ develop programs using functions, arrays, structures and unions in C ➤ generate programs using OOP concepts ➤ design and develop C and C++ programs for the given real world problem.		

PREREQUISITE:

Programming in C

Solve the problems using

- Operators in C & C++
- Control structures in C & C++
- Functions
- Storage Classes
- Arrays
- Structure & Union
- Pointers
- File Management in C++

- Classes and Objects
- Inheritance & Overloading

Course Outcomes:

On the successful completion of the course, students should be able to

CO1: design algorithms for the given problem and Write programs in C and **K3**
  C++
CO2: write C programs using pointers, Structures and unions **K3**
CO3: implement C++ programs using OOPs concepts **K4**
CO4: Build C and C++ applications to solve any kind of real world problem **K6**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	S	S	S	S	S	M	S
CO2	S	S	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	M	M	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Ms.P.Kalpana
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-VIII- PROGRAMMING IN JAVA		
21MCAN213A	**Semester II**	**Credits: 4**	**Hours:**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➤ familiar with the distinct properties and features of Object Orientations. ➤ understand the name space,Exceptions and standard library functions of JAVA ➤ inculcate utility and concurrency conditions in JAVA. ➤ give an exposure toInput/Output functions and java based applications. ➤ impart knowledge in GUI applications.		

PREREQUISITES:

Problem Solving using C & C++
Data Structures and Algorithms

UNIT -- I:
An overview of Java - Java language fundamentals - Class and objects - Constructors - Garbage collection - The finalize method - method overloading – Recursion - this, static and final usage - Nested and Inner classes – Arrays – Inheritance – Method overriding – abstract methods and abstract classes – final methods and final classes. [**12 Hrs**]

UNIT –II
Packages-Interfaces-Exception Handling-String Handling-Object class – Exploring Java.lang package: Wrapper classes-String –StringBuffer. **[12 Hrs]**

UNIT -- III:

Util packages– ArrayList-Calender-Date-HashTable-LinkedList-Vector-Enumset-Stack-Multithreading - Thread priorities - Inter Thread communications – Synchronization - Dead locks. [**12 Hrs**]

UNIT -- IV:

I/O Streams: Byte Stream class-Character stream class-Serialization – JDBC-Data Manipulation-data navigation.[**12 Hrs**]

UNIT -- V:

AWT : AWT controls – layout managers – event handling – applets – appletarchitecture – html applet tag – passing parameters to applet..   [**12 Hrs**]

Books for Study:
1. Herbert Schildt, "***Java 2 complete Reference***", Ninth Edition, Tata McGraw Hill, 2014.
2. Ivan Bayross, "***Java 2.0 (Web Enabled Commercial Application Development***" – BPB Publications India, Edition 2000, ISBN: 81-7656-356-0.

Books for Reference:
1. Peter Norton & William stanck, "***Guide to Java programming***", First Edition,1997, Techmedia Publications, New Delhi.
2. Laura Lemay, Charles l, Perkins, "***Teach Yourself Java 1.1***", First Edition, 1998, Techmedia Publications, New Delhi.
3. Lay S. Horstmann, Gray Cornell. *"Core Java 2 – Fundamentals"* 2nd Edition, 2000.
4. Scott daks& Henry *"Java threads"*, 2nd Edition,Shroff Publishers & Distributors Pvt Ltd.

Web References:
1. URL:http://Docs.oracle.com/javase/tutorials/java/index.html
2. URL:http://javabeginnerstutorial.com/core-java
3. URL:http://www.w3schools.in/java-tutorial/

Course Outcomes:

At the end of the course the student will be able to:

CO1: identify the properties and features of Object Orientations using JAVA   **K2**

CO2: analyze the name space, Exception conditions standard library functions in   **K4** JAVAusing package and Exception handling.

CO3: employ Utility and concurrency conditions in JAVA for complex and   **K3** container types of problems

CO4: apply Input / Output functions and java based applications with file   **K3** manipulations, user interface and database connectivity.

CO5: develop GUI applications using AWT and Appletpackages.   **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	S	M	S	S	M	S	S	S	S	M
CO2	S	S	M	S	S	M	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr.V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-IX- Data and Communication Networks		
21MCAN213B	Semester : II	Credits : 4	Hrs/ Wk :
Cognitive Level	K1 -Recall K2 –Understand K3 – Apply K4 –Analysis		
Learning Objectives	**This Course aims to** • To understand the basic concepts of computer Network • To learn Signals and conversions • To study the concepts of Protocols and switching • To understand the Internet communication technology and its protocols		

PREREQUISITE: Data structures, Operating Systems

Unit–I:

Basic Concepts: Line configuration – Topology – Transmission modes – Categories of networks. The OSI model **–** Functions of the layers – TCP/IP protocol suite (1**8 hours**) **Unit–**

II:

Signals: Analog and digital data – analog and digital signals – periodic and Aperiodic signals – analog signals – decomposition of a digital signal. **Encoding and Modulating:** Digital to digital conversion – analog to digital conversion – digital to analog conversion – analog-to-analog conversion.   **(22 hours)**

Unit–III:

Data Link Protocols: character oriented protocols – bit oriented protocols :HDLC- Stop-and-wait protocol-Sliding window protocol – point-to-point protocol.   (**15 hours**)

Unit–IV:

Networking and internetworking devices: Repeaters – bridges – routers – gate-ways – other devices – routing algorithms – distance vector routing – link state routing.

(**15 hours**)

Unit–V:

Overview of TCP/IP – network layer – addressing – subnetting – transport layer –client server model – Domain Name System(DNS) – telnet – File Transfer Protocol (FTP) – Trivial File Transfer Protocol (TFTP) – Simple Mail Transfer Protocol(SMTP) – Simple Network Management Protocol (SNMP) – Hypertext Transfer Protocol (HTTP) – World Wide Web (WWW). (**20 hours**)

Books for Study:

1. Behrouz A Forouzan, "***Data Communication and Networking***", 4th edition, Ta-ta McGraw Hill. ISBN: 0072967757

Books for Reference:

1. Andrews S. Tannenbaum, " ***Computer Networks***", , Prentice Hall of India, NewDelhi,July 1998 – 4th Edition.) ISBN 81-203-2175-8.

Web References:

1. http://library.aceondo.net/ebooks/Computer_Science/Data_Communication_and_Networking_by_Behrouz.A.Forouzan_4th.edition.pdf
2. http://iips.icci.edu.iq/images/exam/Computer-Networks---A-Tanenbaum---5th-edition.pdf

Course Outcomes:

On the successful completion of the course, students will be able to
CO1: To cognize the basic concepts of computer Network throw OSI Model   **K1**
CO2: To acquire the knowledge about Signals and conversions   K2
CO3: To study the concepts of Data link Protocols and Networking switching and **K4**
devices
CO4: To recognize the Internet communication technology and its protocols   **K3**

Mapping of COs with POs &PSOs:

CO/PO	PO						PSO			
	1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**
CO1	S	M	M	S	S	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	M	S	M

Strongly Correlating(S)   -   3 marks

Moderately Correlating (M)   -   2 marks

Weakly Correlating (W)   -   1 mark

Prepared By	Dr.V.Priya
Verified By	Dr.S.Mani

Course Code & Title	CC-X- JAVA LAB			
21MCAN213CL	Semester II		Credits: 2	Hours:
Cognitive Level	K2:Understand K3:Apply K4: Analyze K6: Create			
Learning Objectives	**The course aims to** ➢ apply Object oriented Programming Concepts to develop simple applications ➢ Give practical exposure to Networking programs. ➢ Design and Develop multi-tier applications ➢ write JAVA code for the given problems			

PREREQUISITES:

Problem Solving using C & C++
Programming in JAVA

Solve the problems using

- Operators
- Control structures
- Arrays&String Manipulation
- Classes and objects
- Constructors
- Method Overloading
- Abstract class, Inheritance
- Method overriding&'static', 'This', 'Final' and 'super' keyword
- Packages, Interfaces
- Exception handling
- Thread&Streams
- AWT control based applications
- Database connectivity (queries)

Course Outcomes

At the end of the course the student will be able to:

CO1: apply the concepts of Java to solve simple problems.   **K3**
CO2: develop, execute and troubleshoot programs using networking concepts.   **K4**
CO3: design and developmulti-tier applications using JDBC   **K6**
CO4: build simple applications using JAVA   **K6**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	M	M	M	S	S	S	S	S	S	S	S
CO2	M	S	S	S	S	S	S	S	S	S	S	S
CO3	M	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Dr..V.Priya
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XI- WEB DESIGN AND DEVELOPMENT [PHP, MySQL, AJAX]		
21MCAN321A	**Semester III**	**Credits: 4**	
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyze		
Learning Objectives	**The course aims to** ➢ study the components for web technology ➢ give exposure to server side script –PHP ➢ conversant in MySQL database and its connectivity with PHP ➢ imbibe knowledge in Web applications with Ajax ➢ familiar with content management system		

PREREQUISITES:

Data Base System

Computer Networks

UNIT I:

Web Medium: Core web technologies – web browsers – Markup Languages – Style sheet technologies – programming technologies – client side, server side – network and related protocols – Introduction to static, dynamic and active web pages.   [**12 Hrs**]
Self -Study: HTML elements and attribute. CSS: Properties and values.

UNIT II:
Programming in PHP – Structure and syntax of PHP and integrating the same with HTML –

Comments – Variables – data types – operators – Control structures - Arrays and functions-Passing information between pages – Strings. **[12 Hrs]**

UNIT III:

MySQL Databases: MySQL introduction – data types in MySQL – DDL- DML-DCL-Pattern Matching – GroupBy – IS NULL – DISTINCT Optimization – Max and Min function – Using auto increment, Check, NULL, NOT NULL, UNIQUE and Integrity Constraints. **[12 Hrs]**

UNIT IV:

PHP / MySQL Functions: Mysql_connect, mysql_pconnect, mysql_query, mysql_fetch_array, mysql_select_db, mysql_fetch_assoc, mysql_fetch_row, mysql_fetch_field, mysql_num_rows, mysql_error, mysql_errno and mysql_close. **Apache& MySQL:** Using PHP with MySQL – using tables – form design – editing the data base – validation – using Apache Web Server – handling and avoiding errors – creating an interactive web page using AMP technology. **[14 Hrs]**

UNIT V:

Ajax and Future Web Applications: Functionality - Advantages of Web Applications - HTTP and HTML - PHP and server side Technologies - JavaScript and Client side technologies- Understanding Ajax - Building Simple Application with Ajax and PHP. **[10 Hrs]**

Books for Study:
1. Thomas A Powell, "***Web Design – The complete Reference***", Tata McGraw-Hill, Second Edition, 2003. UNIT I
2. TiothyBoronczyk, Elizabeth Naramore, Jason Gerner,Yann Le Scouarnec,JeremyStolz,Michael K Glass, " ***Beginning PHP6, Apache, MySQL Web Development***", Wiley Publishing,Inc, 2009ISBN: 978-0-470-39114-3.
3. CristianDarie, BogdanBrinzarea, FilipCherecheş-Toşa, MihaiBucica, "***Building Responsive Web Applications with Ajax and PHP***", Packet Publishing(UNIT V)

Books for Reference:
1. AndiGutmans, StigSætherBakken and DerickRethans, "***PHP5 Power Programming***", Prentice Hall.
2. Hagen Graf, "***Building websites with Joomla***", Packet Publishing House, January 2005.

Web References:
1. www,w3schools.com
2. www.phptpoint.com/php-tutorial

Course Outcomes

On the successful completion of the course, students will be able to

CO1: Summarize the technologies required for the web development   **K2**
CO2: Develop simple programs using php   **K3**
CO3: interpret MySQL functions with php to maintain the database   **K4**
CO4: Relate Ajax with WAMP   **K3**
CO5: Organize web site and publish through CMS   **K4**

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	S	S	M	M	S	M	M	S	S	M	S	S
CO2	S	S	S	M	S	M	M	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	M	S	M	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XII- COMPUTER GRAPHICS		
21MCAN321B	Semester III	Credits: 4	
Cognitive Level	K2: Understand K3: Apply K4: Analyze		
Learning Objectives	**The course aims to** • introduce the concepts of computer graphics. • gain knowledge about graphics hardware devices and software used. • understand the two dimensional graphics and their transformations. • understand the three dimensional graphics and their transformations. • be familiar with understand clipping techniques.		

Unit-I:

Introduction: Applications of Computer Graphics, Raster Scan System, Random Scan System, Raster Scan Display Processors. Output Primitives: Points and Lines – Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms.

Unit-II:

Two Dimensional Geometric Transformations- Matrix Representations and Homogeneous Coordinates, Composite Transformations, Transformations between Coordinate Systems – Two Dimensional Clipping and Viewing: The viewing pipeline, Viewing coordinate reference Frame, Window to View-port Coordinate transformation, viewing functions, Cohen-Sutherland and Sutherland Hodgeman Polygon clipping algorithm.

Unit-III:

Graphics Structures – Hierarchical modeling – Graphical User Interfaces and Interactive Input Methods.

Unit-IV:

Object Representation: Polygon surfaces, Quadric surfaces, Splin representation, Hermite Curve, Bezier Curve and B-Spline Curve, Bezier and B-Spline surfaces - Three Dimensional Geometric Transformations: Three Dimensional Viewing, Clipping, Projections(Parallel and Perspective).

Unit-V:

Visible Surface Detection Methods: Classification, back-face Detection, Depth-buffer, scan-line and depth sorting– Computer animation.

Books for Study:

1. Donald Hearn and M.Pauline Baker, "*Computer Graphics C Version*", Pearson Education 2003, Second Edition,ISBN *0-13-530924-7*.
2. John F. Hughes, Andries Van Dam, Morgan Mc Guire, David F. Sklar, James D. Foley, Steven K. Feiner and Kurt Akeley ,"**Computer Graphics: Principles and Practice**", 3rd Edition, AddisonWesley Professional,2013.

Books for Reference:

1. Foley, Vandam, Feiner, Huges, "*Computer Graphics: Principles & Practice*", Pearson Education, Second Edition 2003, *ISBN*: 0201121107,9780201121100.
2. Donald Hearn and M. Pauline Baker, Warren Carithers, "**Computer Graphics With Open GL**", 4th Edition, Pearson Education, 2010.

Web References:

- en.wikipedia.org/wiki/2D_computer_graphics
- en.wikipedia.org/wiki/3D_computer_graphics
- www.overdrivepc.com/computer_graphics_hearn_baker_solution_manual.pdf
- www.edx.org/course/computer-graphics
- www.cgmeetup.net/home/

COURSE OUTCOMES:

At the end of the course, the student should be able to

> **CO1:** design two dimensional graphics.
>
> **CO2:** apply two dimensional transformations.
>
> **CO3**: design three dimensional graphics.
>
> **CO4**: apply three dimensional transformations.
>
> **CO5:** apply clipping techniques to graphics.
>
> **CO6:** design animation sequences.

Mapping of COs with POs &PSOs:

CO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO1	M		M	M	M	M	M	S	M	M	S	S
CO2	S	S	S	M	S	M	M	S	M	S		M
CO3	S	M	S	S		S	S	S	M		S	S
CO4	S	S	M	M	S	M	S	S	M	M	S	S
CO5	S	M	S	S	S	M	S	S	M			M

Prepared By	Dr K Deepa
Verified By	Dr.M.Muralidharan

Course Code & Title	CC-XIII- WEB DESIGN LAB		
21MCAN321CL	**Semester III**	**Credits: 2**	**Hours:**
Cognitive Level	**K3:** Apply **K4:** Analyze **K6:** Create		
Learning Objectives	**The course aims to** ➢ develop script using PHP ➢ apply knowledge PHP and MySql to develop interactive webpage ➢ design and develop Interactive web page using Ajax and JQuery. ➢ classify the given problem and design the web page		

PREREQUISITES:

Data Base Lab

Develop Static Web page using

Basic HTML tags like formatting tags, img, List tags, Links tags,
Table tags in HTML
Web page using forms tags in HTML

Develop PHP Programs

Operators, control structures

Arrays and loops

Functions, passing information between pages

Simple utilities with HTML&PHP: BMI calculator, Currency Converter etc

Develop programs using PHP & MySQL

MySQL Commands & constraints

PHP-MYSQL (connection establishment, table creation, insertion, updation& selection queries)

Develop web sites using AMP

Simple Dynamic Pages

Interactive Web Pages: Ecommerce, Entertainment, Simple academic site

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: develop simple PHP scripts		**K3**
CO2: create simple web pages using HTML and PHP.		**K6**
CO3: design and develop interactive pages using HTML, PHP and MySQL		**K4**
CO4: build interactive web pages using PHP, MySQL, Ajax and JQuery.		**K6**

Mapping of Cos with POs &PSOs:

CO	PO								PSO			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**
CO1	S	M	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

Prepared By	Mrs.K.PonvelAzhagu Lakshmi
Verified By	Dr.M.Muralidharan