

**AUXILIUM COLLEGE (Autonomous)**  
*(Accredited by NAAC with A+ Grade with a CGPA of 3.55 out of 4 in the 3rd Cycle)*  
**Gandhi Nagar, Vellore-632 006**

**Department of Computer Applications (B.C.A.) - (UG)**

**OUTCOME BASED EDUCATION**

(Effective for the Batch of Students Admitted from 2023-2024)

**A) INSTITUTION LEVEL**

**Vision**

The vision of the college is the education of young women especially the poorest to become empowered and efficient leaders of integrity for the society.

**Mission**

To impart higher education to the economically weak, socially backward and needy students of Vellore and neighboring districts.

**B) NAME OF THE PROGRAMME: B.C.A.**

**VISION OF THE PROGRAMME**

- To provide a intellectual environment that fosters the search for new knowledge in a highly dynamic computing world
- To be a leading, contemporary, innovative programme in inculcating professional competencies in the field of Computing and related interdisciplinary technologies to achieve academic excellence and to facilitate research activities as a timely response to dynamic needs and challenges of industry and society.

**C) ELIGIBILITY CRITERIA OF THE PROGRAMME**

The basic BCA eligibility is to possess an aggregate of 50% or above in Class 12 in any stream (Arts, Science, Commerce) with English as a compulsory subject.

**D) List of Courses:**

Sem	Part	Paper Code	Title of Paper	Hours /Week	Exam Hours		Credits	Marks
					Th	Pr		
I	I	ULTAA20	Tamil Paper - I	6	3	-	3	40+60
	II	UENGA20	English Paper - I	6	3	-	3	40+60
	III	UCCAA23	Programming in C	4	3	-	4	40+60
	III	UCCAB23	Fundamentals of Information Technology	4	3	-	3	40+60
	III	UAAFA23	Allied - I : Accounting Fundamentals - I	5	3	-	4	40+60
	III	UCCAC23	Practical - I: C	2	-	3	2	40+60
	IV	-	Skill-Based Elective - I	2	-	2	2	40+60
	IV	-	Value Education	1	-	-	-	-
<b>Total</b>							21	600
II	I	ULTAB20	Tamil Paper - II	6	3	-	3	40+60
	II	UENGB20	English Paper - II	6	3	-	3	40+60
	III	UCCAD23	Python	4	3	-	3	40+60
		UCCAE23	Computer Organization and Architecture	4	3	-	4	40+60
	III	UAAFB23	Allied - II : Accounting Fundamentals - II	5	3	-	4	40+60
	III	UCCAF23	Practical - II: Python	2	-	3	2	40+60
	IV	-	Skill-Based Elective - II	2	-	2	2	40+60
	IV	-	Value Education	1	-	-	-	-
<b>Total</b>							21	600
III	I	ULTAC20	Tamil Paper - III	5	3	-	3	40+60
	II	UENGC20	English Paper -III	6	3	-	3	40+60
	III	UCCAG23	Data Structures	5	3	-	4	40+60
	III	UCCAH23	Java Programming	4	3	-	3	40 + 60
	III	UACAA23	Allied: Mathematical Foundations	5	3	-	4	40+60
	III	UCCAI23	Practical - III: Java	2	-	3	2	40+60
	IV	USCAA320	SBE: Accounting Software	2	-	2	2	40+60
	IV	-	Value Education	1	-	-	-	-
<b>Total</b>							21	600
IV	I	ULTAD20	Tamil Paper - IV	6	3	-	3	40+60
	II	UENGD20	English Paper -IV	5	3	-	3	40+60
	III	UCCAJ23	Data Communications and Networking	5	3	-	4	40+60
	III	UCCAK23	Practical: IV - Linux	4	3	-	5	40+60

	III	UACAB23	Allied - Statistical Methods	5	-	3	4	40+60
	IV	USCSB420	SBE: Design and Animation	2	-	2	2	40+60
	IV	UNEVS20	Environment Studies	2	2	-	2	40+60
	IV	-	Value Education	1	-	-	-	-
<b>Total</b>							23	700
V	III	UCCAL23	Relational Database Management Systems	5	3	-	3	40+60
	III	UCCAM23	Software Engineering	5	3	-	5	40+60
	III	UCCAN23	Mobile Application Development	4	3	-	3	40+60
	III	UECAA20	Elective - I A: Resource Management Techniques	5	3	-	5	40+60
		UECAB20	Elective - I B: Cloud Computing					
		UECAC20	Elective - I C: Object Oriented Analysis and Design					
	III	UCCAO23	Practical - V: RDBMS	3	-	3	2	40+60
	III	UCCAP23	Practical - VI: Mobile Application Development	2	-	3	2	40+60
	IV	-	Non-Major Elective - I	3	2	-	2	40+60
	IV	USCSF520	Skill-Based Elective – V:	2	2	-	2	40+60
IV		Value Education	1	-	-	-	-	
<b>Total</b>							24	700
VI	III	UCCAQ23	Internet and Web Programming	5	3	-	3	40+60
	III	UCCAR23	Data Mining	4	3	-	5	40+60
	III	UECAD20	Elective - II A: Cryptography	5	3	-	5	40+60
		UECAE20	Elective - II B: Computer Graphics					
	III	UECAF20	Elective - III A: Mobile Computing	5	3	-	5	40+60
	III	UECAG20	Elective - III B: Artificial Intelligence					
	III	UCCAS23	Practical VII: Internet and Web Programming	3	-	3	2	40+60
		UCCAT23	Project Work	2	-	3	3	40+60
IV	-	Non-Major Elective - I	3	-	2	2	40+60	
IV	USCSG620	Skill-Based Elective - VI:	2	-	2	2	40+60	
IV	UVEDA22	Value Education	1	2	-	2	40+60	
<b>Total</b>							29	800
V	Extension Activities (90 Hours)						1	
	Fundamentals of Computer & MS office						2	
<b>Grand Total</b>							142	400

## **E) Programme Objectives (PO)**

- PO1:** Attain knowledge and understand the principles and concepts in the respective discipline.
- PO2:** Acquire and apply analytical, critical and creative thinking, and problem-solving skills
- PO3:** Effectively communicate general and discipline-specific information, ideas and opinions.
- PO4:** Appreciate biodiversity and enhance eco-consciousness for sustainable development of the society.
- PO5:** Emulate positive social values and exercise leadership qualities and team work.
- PO6:** Pursue higher knowledge, qualify professionally, enhance entrepreneurial skills and contribute towards the needs of the society.

## **F) Programme Specific Outcomes (PSO)**

- PSO1:** Equip the students with requisite knowledge, skills and right attitude necessary to provide effective software development skills in a global environment and also focus on preparing students for roles pertaining to computer applications and IT industry.
- PSO2:** Acquire skills in computer and information technology and also be competent in the field of Commerce, Mathematics and Management.
- PSO3:** Introduce and update knowledge relevant to IT like networking, computer graphics, web development, trouble shooting, and hardware and software skills. Also to develop software solutions to problems across a broad range of application domains through analysis and design.
- PSO4:** Become proficient and ensure job in the key areas of computer science like Web designing and development, Mobile applications, Network and communication technologies, undertaking government organizations, faculty for computer science and applications in educating institutions.
- PSO5:** Ability to analyze social and environmental aspects with professional values, ethics and equity to transform the knowledge, skills and expertise to the community.
- PSO6:** Ability to work as a member or leader in diverse teams in multidisciplinary environment. And identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

## SEMESTER I

### UCCAA23 - PROGRAMMING IN C

<b>Year: I</b> <b>Sem: I</b>	<b>Course Code:</b> UCCAA23	<b>Title of the Course:</b> Programming in C	<b>Course Type :</b> Theory	<b>Course Category</b> Core	<b>H/W</b> 4	<b>Credits</b> 4	<b>Marks</b> 40+60
---------------------------------	--------------------------------	---	--------------------------------	--------------------------------	-----------------	---------------------	-----------------------

#### COURSE OBJECTIVES

1. To introduce students to the concept of basic programming- thereby reducing the design complexity and increasing the reusability of a component.
2. The course is designed to provide complete knowledge of C language.
3. Students will be able to develop logics which will help them to create programs, applications in C.
4. Also by learning the basic programming constructs they can easily switch over to any other language in future.
5. To create a program that measures or simulates performance and use it to analyze behavior.

#### COURSE OUTCOMES

The Learners will be able to

1. Introduce the students to understand the concept of basic programming- thereby reducing the design complexity and increasing the reusability of a component.
2. Construct the basic structure of C-programming, declaration and usage of variable.
3. Understand and develop conditional and iterative statements to write programs.
4. Exercise C programs that uses array and string.
5. Develop user defined functions to solve real time problems

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	L	M	M
CO2	M	L	M	H	L	M
CO3	L	H	L	M	M	L
CO4	M	M	M	L	H	M
CO5	M	L	M	L	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	L	H	L	H	M	L
CO3	M	H	M	L	H	M
CO4	H	L	H	H	L	M
CO5	H	H	L	H	M	H

## COURSE SYLLABUS

### Unit I

Hours: 12

- 1.1 Algorithm and Flowchart (K1,K2,K3,K4)
- 1.2 Overview of C (K2)
- 1.3 Basic Techniques: Sum of Two Given Numbers- Swapping Two Numbers - Simple Interest Calculation (K1,K2,K3,K4)
- 1.4 Constants (K2,K3)
- 1.5 Variables (K2, K3)
- 1.6 Data Types. (K2 K3)

### Unit II

Hours: 12

- 2.1 Operators (K1, K2)
- 2.2 Expressions (K1, K2)
- 2.3 Managing Input Operations (K1, K2, K3, K4)
- 2.4 Managing Output Operations (K1, K2, K3, K4)
- 2.5 Decision Making and Branching (K1, K2, K3, K4)
- 2.6 Decision Making and Looping (K1, K2, K3, K4)

### Unit III

Hours: 12

- 3.1 Arrays (K1, K2, K3)
- 3.2 One Dimensional Array (K1, K2, K3)
- 3.3 Two Dimensional Array (K1, K2, K3)
- 3.4 Multi-Dimensional Array (K1, K2)
- 3.5 Dynamic Array (K1, K2)
- 3.6 Predefined Streams (K1)

### Unit IV

Hours: 12

- 4.1 Character Arrays and Strings (K1, K2, K3)
- 4.2 Reading and Writing String (K1, K2, K3)
- 4.3 Arithmetic Operation on Characters (K1, K2, K3)
- 4.4 Putting String Together and Comparison of Two Strings (K1, K2, K3)
- 4.5 String Handling Functions (K1, K2, K3)
- 4.6 Other Features of Strings (K1, K2)

### Unit V

Hours: 12

- 5.1 User-Defined Functions (K1, K2, K3)
- 5.2 Categories of functions (K1, K2, K3)
- 5.3 Recursions (K1, K2, K3)
- 5.4 Passing Array to Functions and Passing Strings to Functions (K1, K2, K3)

5.5 Scope- Visibility and Lifetime of Variables (K1, K2, K3)

5.6 Structures and Unions. (K1, K2, K3)

**Book for Study:**

1. Balagurusamy, “Programming in C”, 8<sup>th</sup> Edition, Tata McGraw Hill Publication, 2020.

**Books for Reference:**

1. Ashok N. Kamathane - “Programming with C”, Third Edition, Pearson Publication, 2011.
2. M. G. Venkateshmurthy, “Programming Techniques through C: A Beginner's Companion”, 1<sup>st</sup> Edition, Pearson India, 2006.
3. Yashavant Kanetkar, “Let Us C : Authentic guide to C programming language”, 18<sup>th</sup> edition, BPB Publications, 2021.

**OER:**

1. [https://www.freebookcentre.net/programming-books-download/C-Language-Tutorial-\(PDF-124P\).html](https://www.freebookcentre.net/programming-books-download/C-Language-Tutorial-(PDF-124P).html)
2. <http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20OC%20Programming%20Language.pdf>

## SEMESTER I

### UCCAB23 - FUNDAMENTALS OF INFORMATION TECHNOLOGY

<b>Year: I</b> <b>Sem: I</b>	<b>Course Code</b> UCCAB23	<b>Title of the Course</b> Fundamentals of Information Technology	<b>Course Type</b> Theory	<b>Course Category</b> Core	<b>H/W</b> 4	<b>Credits</b> 3	<b>Marks</b> 40+60
---------------------------------	-------------------------------	--	------------------------------	--------------------------------	-----------------	---------------------	-----------------------

#### COURSE OBJECTIVES

1. The main objective is to introduce Information Technology in a Simple Language to all undergraduate students regardless of their specialization.
2. To have the knowledge about communication networks and various types of network.
3. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry.
4. To understand operating system and Evolution and development of operating system.
5. To know the difference between windows and DOS.

#### COURSE OUTCOMES

The Learners will be able to

1. Understand the fundamental concepts of computers with the present level of knowledge of the students.
2. Identify the basic terminology used in computer programming.
3. Understand the basic taxonomy and terminology of the data communication networking.
4. Acquire the knowledge of Internet and its applications
5. Analyze the difference between an operating system and an application program.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	L	H
CO2	L	M	L	H	L	H
CO3	H	L	L	M	M	M
CO4	M	L	M	M	L	M
CO5	M	M	L	M	M	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	M	H	L	M	M	H
CO3	H	L	M	H	L	M
CO4	L	H	H	L	M	M
CO5	H	M	M	H	L	H



**COURSE SYLLABUS:**

**Unit I**

**Hours: 12**

- 3.1 Definition and Technological Trends in IT (K1,K2,K3)
- 3.2 Applications of Information Technology (K1,K2)
- 3.3 Introduction to Computers: Definition - Characteristics of a Computer (K1,K2)
- 3.4 Classification of Computers (K1,K2)
- 3.5 Basic Anatomy of the Computer (K1,K2)
- 3.6 Applications / Uses of Computers in Different Fields (K1,K2)

**Unit II**

**Hours: 12**

- 1.1 Input Devices (K1,K2)
- 1.2 Output Devices (K1,K2)
- 1.3 Data Representation (K1,K2)
- 1.4 Programming Languages / Computer Languages (K1,K2)
- 1.5 System Software and Application Software (K1,K2)
- 1.6 Difference between System Software and Application Software (K1, K2, K3)

**Unit III**

**Hours: 12**

- 3.1 Computer Networks : Overview of Networks (K1)
- 3.2 Intranet and Extranet (K2)
- 3.3 Communication Processor (K2)
- 3.4 Communication Media (K2)
- 3.5 Types of Networks: LAN, MAN, WAN (K2)
- 3.6 Network Topologies (K2)

**Unit IV**

**Hours: 12**

- 4.1 Internet and its Applications : History of Internet - Uses of Internet - Advantages of Internet (K1)
- 4.2 Internet Access: Types of Internet Connections (K2)
- 4.3 Internet Protocols and Services (K2)
- 4.4 Internet Addressing: IP Address – URL – DNS (K2)
- 4.5 Web Browser and Search Engine (K3)
- 4.6 E-mail (K3)

**Unit V**

**Hours: 12**

- 5.1 Operating System: Evolution of Operating Systems (K1)
- 5.2 Function of Operating System (K2)
- 5.3 Classification of Operating System (K2)
- 5.4 Example of Operating System – DOS – Windows – UNIX - Linux (K2)
- 5.5 Difference between Windows and DOS (K2)
- 5.6 Difference between Linux and Windows (K2)

**Book for Study:**

- 1. Alexis Leon and Mathews Leon, “Fundamentals of Information Technology”, Second Edition, Vikas Publishing House Pvt. Ltd., 2020.

**Books for Reference:**

1. Dr. P.Rizwan Ahmed, “Introduction to Information Technology”, Second Edition, Margham Publications, Chennai, 2016
2. Pelin Aksoy, Laura DeNardis, “Introduction to Information Technology”, 1st Edition, Cengage Learning India Private Limited, 2009.
3. Alexis Leon and Mathew Leon, “Internet for Everyone”, Second Edition, Vikas Publishing, 2011.

**OER:**

1. <http://bookboon.com/en/it-programming-ebooks>
2. [http://www.engineering108.com/pages/IT-Programming/IT Programming ebooks free download.html](http://www.engineering108.com/pages/IT-Programming/IT%20Programming%20ebooks%20free%20download.html)

## SEMESTER I

### UCCAC23 - PRACTICAL I: C

Year: I	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: I	UCCAC23	Practical I: C	Practical	Core	2	2	40+60

### COURSE OBJECTIVES

1. To introduce students to the concept of basic programming- thereby reducing the design complexity and increasing the reusability of a component.
2. To learn data types and control structures in C.
3. To improve upon a solution to a problem.
4. Analyze a given problem and develop an algorithm to solve the problem.
5. To design, develop and test programs written in C.

### COURSE OUTCOMES

The Learners will be able to

1. Exercise with basic structure of the C program, declaration and usage of variable.
2. Resolve mathematical and scientific problem.
3. Develop the programs using conditional and iterative statements.
4. Implement array and string concept in C program.
5. Write real time problems using user defined functions

CO/PO	PO					
	1	2	3	4	5	6
CO1	L	H	M	M	L	H
CO2	M	L	L	L	H	M
CO3	M	H	M	L	M	M
CO4	L	M	L	M	L	L
CO5	H	M	L	M	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	H	H	H	M	L
CO2	L	L	M	L	L	H
CO3	H	M	M	H	H	M
CO4	L	H	L	M	M	H
CO5	M	H	H	H	M	L

Low - L, Medium - M, High - H

**Practical Program:****Hours: 30**

1. Input and Output Operations.
2. Decision Making Statements.
3. Arrays and Looping Statements.
4. Two Dimensional Arrays.
5. The Concept of Functions.
6. Recursion.
7. Character Arrays
8. Structures and Unions

## SEMESTER I

### UAAFA23 – ALLIED I: ACCOUNTING FUNDAMENTALS - I

Year: I Sem: I	Course Code	Title of the Course	Course type	Course Category	No. of Hours	Credits	Marks
	UAAFA23	Accounting Fundamentals–I	Theory	Allied	5	4	40+60

#### Course Objectives:

1. To introduce the basic concepts and conventions of accounting.
2. To teach them accounting techniques used in a business.
3. Teach them practically to prepare accounting reports.
4. Develop the skills needed to analyze the financial statement effectively.
5. To teach the learners to sort the financial records of various companies and reveal their financial positions to interested parties of business.

#### Course Outcomes:

Upon the successful completion of this course the students will have the ability to

1. Adopt the rules of Double entry system in sorting and preparing Accounts.
2. Understand the Accounting Cycle and prepare various accounts and to check Accounting errors.
3. Calculate and explain financial Accounts to reveal the profits/losses of an organization and also to evaluate the values of Assets and Liabilities.
4. Charge Depreciation on assets under straight line and written down value methods.
5. Differentiate Single entry & Double entry and ascertain the net worth of a business.

#### COs consistency with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
	1	H	H	H	M	H
2	H	H	M	H	H	H
3	H	M	H	M	H	M
4	H	M	H	H	M	H
5	M	H	M	H	H	M

(Low– L, Medium– M, High– H)

#### COs consistency with PSOs

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	1	H	H	M	M	M
2	H	H	M	H	H	M

3	H	M	M	M	H	M
4	H	M	M	M	M	H
5	M	H	M	H	H	M

## COURSE SYLLABUS

### Unit I: Introduction to Accounting, Concepts & Conventions & Accounting Cycle (15 Hours)

- 1.1. Meaning of Accounting, Definition of Accounting, Need and Steps in Accounting. (K<sub>1</sub>, K<sub>2</sub>)
- 1.2. Advantage and limitations of Accounting, Groups interested in Accounting and Branches of Accounting. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 1.3. Concepts and Conventions of Accounting, Classification of Various concepts and Conventions. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 1.4. Double Entry System- (Accounting Equations, Rules pertaining to Accounting equations), and Accounting Cycle. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)
- 1.5. Journal: Recording of transactions. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)
- 1.6. Ledger- Classification of transactions. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)

### Unit II: Trial Balance, Subsidiary Books & Bank Reconciliation Statements (15 Hours)

- 2.1. Meaning of Trial balance, Definition, Objectives, Methods of Trial balance, Schedule of Debtors and Creditors and Errors not disclosed in Trial Balance. (K<sub>1</sub>, K<sub>2</sub>)
- 2.2. Problems (Trial Balance). (K<sub>3</sub>, K<sub>4</sub>)
- 2.3. Meaning of Subsidiary books, Types of Subsidiary books, Benefits, Methods of Recording and Posting. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 2.4. Accounting treatment of Subsidiary books. (K<sub>3</sub>, K<sub>4</sub>)
- 2.5. :Meaning of Reconciliation, Need, Causes for difference and Methods of preparing Bank Reconciliation Statements. (K<sub>1</sub>, K<sub>2</sub>)
- 2.6. :Preparation of Bank Reconciliation Statement. (K<sub>3</sub>, K<sub>4</sub>)

### Unit III: Final Accounts with Simple adjustments (15 Hours)

- 3.1. Introduction to Final Accounts, Meaning of Manufacturing Account and features of Manufacturing Accounts. (K<sub>1</sub>, K<sub>2</sub>)
- 3.2. Trading Account Meaning and its Accounting treatment. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 3.3. Profit & Loss Account Meaning and its accounting treatment. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 3.4. Balance sheet meaning, Classification of Assets and Liabilities and Adjustments. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 3.5. Problems (Final Accounts without Adjustments). (K<sub>3</sub>, K<sub>4</sub>)
- 3.6. Problems (Final Accounts with Simple Adjustments). (K<sub>3</sub>, K<sub>4</sub>)

### Unit IV: Depreciation Accounting (15 Hours)

- 4.1. Meaning and Definition of Depreciation, Characteristic features of Depreciation. (K<sub>1</sub>, K<sub>2</sub>)
- 4.2. Objectives of Depreciation, Factors affecting the amount of Depreciation. (K<sub>1</sub>, K<sub>2</sub>)
- 4.3. Methods of providing depreciation – Introduction. (K<sub>1</sub>, K<sub>2</sub>)
- 4.4. Straight Line method Meaning, Merits and Demerits, Calculations for finding the Rate of Depreciation (& More than one Asset). (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 4.5. Diminishing Balance method Meaning, Merits and Demerits, Simple problems. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 4.6. Problems related to Depreciation. (K<sub>3</sub>, K<sub>4</sub>)

### Unit V: Single Entry System (15 Hours)

- 5.1. Meaning, Definition, Characteristic Features and Limitations of Single Entry System. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 5.2. Difference between Double Entry System and Single Entry System. (K<sub>3</sub>, K<sub>4</sub>)

- 5.3. Ascertainment of Profit: Net worth method, Steps in calculating Profit or Loss. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 5.4. Conversion Method: Meaning, Need, Steps for conversion of incomplete records. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 5.5. Net worth Method: Preparation of Statement of Affairs and Statement of Profit. (K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)
- 5.6. Conversion Method: Debtors Account, Creditors Account, Bills Payable Account, Bills receivable Account and preparation of Final Account. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)

**Text Books:**

Reddy T.S and Murthy – Advanced Accountancy – Margham Publications, Chennai, Reprint 2018

**Reference Books**

1. Shukla M.C., Gupta M.P., Agarwal B.M. and Grewal T.S. – Advanced Accounts (Volume I) – S. Chand & Company Limited, New Delhi, Reprint 2019.
2. Nagarajan K.L., Vinayagam N. And Mani P.L. – Principles of Accountancy – Eurasia Publishing House, New Delhi, Revised Edition 2017.
3. Jain S.P., Narang K.L., Mukesh Kumar Sharma, Romila Jain and Satish Khasa – Financial Accounting – Kalyani Publishing House, New Delhi, Reprint 2018.
4. Tulsian P.C. – Financial Accounting – Pearson Education, New Delhi, Edition Reprint – 2017.
5. Raman B.S. – Financial Accounting (Vol-I) - United Publishers and Distributors – Guwahati, Edition 2018.

**Web Resources:**

1. MIT Open Course Ware (<http://ocw.mit.edu/courses/sloan>)
2. [www.accountingschoolguide.com](http://www.accountingschoolguide.com)
3. [www.edx.org](http://www.edx.org)
4. study.com
5. [www.accountingcoach.com](http://www.accountingcoach.com)
6. fasab.gov
7. [www.freebookcentre.net](http://www.freebookcentre.net)

## SEMESTER II

### UCCAD23 – PYTHON

Year: I	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: II	UCCAD23	Python	Theory	Core	4	3	40+60

#### COURSE OBJECTIVES

1. To describe the core syntax and semantics of Python programming language.
2. To discover the need for working with the strings and functions.
3. To illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4. To design real life situational problems and think creatively about solutions of them.
5. To apply a solution clearly and accurately in a program using Python

#### COURSE OUTCOMES (Cos)

The Learners will be able to

1. Understand the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
2. Express different Decision Making statements and Functions
3. Interpret Object oriented programming in Python
4. Explain how to design GUI Applications in Python and evaluate different database operations
5. Design and develop Client Server network applications using python

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	M	M	M
CO2	M	M	M	M	H	H
CO3	M	M	M	L	L	M
CO4	H	M	L	M	H	H
CO5	M	L	M	H	M	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	L	M	H
CO2	L	M	L	H	M	L
CO3	M	H	M	L	H	M
CO4	H	L	H	M	L	M
CO5	L	M	L	H	M	H



**Low - L, Medium - M, High – H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours: 12**

- 1.1 Computer Systems - Python Programming Language (K1,K2)
- 1.2 Computational Thinking Python Data Types(K1,K2)
- 1.3 Expressions, Variables, and Assignments(K2,K3)
- 1.4 Strings - Lists (K2,K3)
- 1.5 Objects & Classes (K1, K2, K3,K4)
- 1.6 Python standard library. (K5, K6)

### **Unit II**

**Hours: 12**

- 1.1 Imperative Programming(K3)
- 1.2 Python Modules - Print() (K3,K4)
- 1.3 Function - Functional Eval() Execution Control Structures (K2,K3,K4)
- 1.4 User Defined Functions (K2,K3)
- 1.5 Python Variables(K3)
- 1.6 Assignments Parameter Passing.(K3)

### **Unit III**

**Hours: 12**

- 3.1 Text Data (K2,K3,K4)
- 3.2 Exceptions (k4)
- 3.3 Strings Revisited - Formatted Output(K3,K4)
- 3.4 Files(K2,K3)
- 3.5 Errors &Exceptions Execution Control Structures(K2,K3)
- 3.6 Decision Control & The IF Statement(K3,K4)

### **Unit IV**

**Hours: 12**

- 4.1 Container And Randomness (K2, K3)
- 4.2 Dictionaries (K3, K4)
- 4.3 Other Built-in Container Types (K2, K3)
- 4.4 Character Encodings (K2)
- 4.5 Strings (K2,K3)
- 4.6 Module Random (K3)

### **Unit V**

**Hours: 12**

- 5.1 FOR Loop & Iteration Patterns (K2, K3)

- 5.2 Two dimensional Lists While Loop (k2,K3)
- 5.3 More Loop Patterns - Additional Iteration (K1,K2,K3)
- 5.4 Control Statements Namespaces - Encapsulation in Functions(K3)
- 5.5 Global Vs. Local Namespaces (K2,K3,K5)
- 5.6 Exceptional Flow Control - Modules as Namespaces(K2,K4)

**Book for Study:**

1. LjubomirPerkovic, “Introduction to Computing Using Python: An Application Development Focus”, 2<sup>nd</sup> Edition, John Wiley & Sons, 2012

**Books for Reference:**

1. Martin C. Brown, “Python: The Complete Reference”, McGraw Hill Education; Fourth Edition, March 2018.
2. N. Ryan Marvin, Amos Omondi - “Python Fundamentals”, 1<sup>st</sup> Edition, Packt Publishing, 2018.
3. Magnus Lie Hetland - “Beginning Python - From Novice to professional”, 3<sup>rd</sup> Edition A Press Publishers, 2008.

**OER:**

1. [www.freebookcentre.net/programming.../Python-Language-Reference.html](http://www.freebookcentre.net/programming.../Python-Language-Reference.html)
2. [www.freebookcentre.net/.../Introduction-to-Python-Programming-Course- Notes.html](http://www.freebookcentre.net/.../Introduction-to-Python-Programming-Course- Notes.html)

**SEMESTER II**  
**UCCAIE23 - COMPUTER ORGANIZATION AND ARCHITECTURE**

<b>Year: I</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
<b>Sem: II</b>	UCCAIE23	Computer Organization and Architecture	Theory	Core	4	4	40+60

**COURSE OBJECTIVES**

1. To make students understand the basic structure and operation of digital computer.
2. To understand the hardware-software interface.
3. To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
4. To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.
5. To familiarize the students with hierarchical memory system including cache memories and virtual memory.

**COURSE OUTCOMES**

The Learners will be able to

1. Explain the organization of basic computer, its design and the design of control Unit.
2. Elaborate advanced concepts of computer architecture, Parallel Processing, Inter-processor communication and synchronization.
3. Demonstrate the working of central processing unit and RISC and CISC Architecture.
4. Describe the operations and language the register transfer, micro operations and input-output organization.
5. Understand the organization of memory and memory management hardware.

CO/PO	PO					
	1	2	3	4	5	6
<b>CO1</b>	M	H	M	M	M	L
<b>CO2</b>	H	M	M	M	H	L
<b>CO3</b>	M	H	H	M	L	H
<b>CO4</b>	H	L	M	M	L	M
<b>CO5</b>	M	L	M	L	M	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	M	H	M	L
CO2	L	M	L	H	M	L
CO3	M	L	M	L	M	M
CO4	H	L	H	L	L	M
CO5	H	M	L	M	M	H

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I

Hours: 13

- 1.1 Digital Computers-Logic Gates-Boolean Algebra (K1, K2)
- 1.2 Map Simplification – Combinational Circuits – Sequential Circuits (K3)
- 1.3 Flip-Flops (SR D JK T) (K3, K4)
- 1.4 Digital Components: Decoders – Multiplexers (K2, K3)
- 1.5 Register – Shift Register (K3)
- 1.6 Data Representation: Data Types - Complements - Other Binary Codes. (K1, K2, K4)

### Unit II

Hours: 11

- 1.1 Basic Computer Organization and Design: Instruction Codes (K2, K3)
- 1.2 Computer Registers (K4)
- 1.3 Computer Instructions (K3, K4)
- 1.4 Timing and Control (K2)
- 1.5 Instruction Cycle (K3, K4)
- 1.6 Memory Reference Instructions. (K3, K4)

### Unit III

Hours: 12

- 3.1 Programming the Basic Computer: Introduction - Machine Language (K2)
- 3.2 Assembly Language (K3, K6)
- 3.3 The Assembler (K3, K4)
- 3.4 Central Processing Units: Introduction - General Register Organization (K2, K3)
- 3.5 Instruction Formats - Addressing Modes (K3, K4)
- 3.6 RISC and CISC Characteristics. (K4)

### Unit IV

Hours: 12

- 4.1 Input Output Organization: Peripheral Devices (K1, K2)
- 4.2 Input/output Interface (K3, K4)
- 4.3 Asynchronous Data Transfer (K3)
- 4.4 Modes of Transfer (K3, K4)
- 4.5 Priority Interrupt (K3)
- 4.6 Direct Memory Access. (K3)

### Unit V

Hours: 12

- 1.1 Memory Organization: Memory Hierarchy (K1, K2)
- 1.2 Main Memory (K1, K2)
- 1.3 Auxiliary Memory (K2, K3)
- 1.4 Cache Memory (K3, K4)
- 1.5 Virtual Memory: Address Space and Memory Space – Address Mapping using Pages (K3, K6)
- 1.6 Associative Memory Page Table – Page Replacement (K3, K6)

**Book for Study:**

1. M. Morris Mano, “Computer System Architecture”, Edition 3, Prentice Hall of India Pvt. Ltd., 2013.
2. Miles Murdocca and Vincent Heuring, “Computer Architecture and Organization: An Integrated Approach”, Second Edition, Wiley Publication, 2015.

**Books for Reference:**

1. Vincent P.Heuring and Harry F. Jordan, “Computer System Design and Architecture, Edition 2, Pearson Education, 2012.
2. William Stallings, “Computer Organization and Architecture Designing for Performance”, Eighth Edition, Pearson Education, 2013.

**OER:**

1. [https://www.academia.edu/31003870/Computer\\_System\\_Architecture\\_3rd\\_Ed\\_by\\_M\\_Morris\\_Mano\\_text\\_pdf](https://www.academia.edu/31003870/Computer_System_Architecture_3rd_Ed_by_M_Morris_Mano_text_pdf)<https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/>

## SEMESTER II

### UCCAF23 – PRACTICAL II: PYTHON

Year: I	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: II	UCCAF23	Practical II: Python	Practical	Core	2	2	40+60

#### COURSE OBJECTIVES

1. To describe the core syntax and semantics of Python programming
2. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.
3. To understand why Python is a useful scripting language for developers.
4. To learn how to design and program Python applications.
5. To learn how to use lists, tuples, and dictionaries in Python programs.

#### COURSE OUTCOMES

The Learners will be able to

1. To Understand the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
2. Express different Decision Making statements and Functions
3. Interpret Object oriented programming in Python
4. Explain how to design GUI Applications in Python and evaluate different database operations
5. Design and develop Client Server network applications using python

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	L	M	L	M	H
CO2	M	M	M	M	H	sH
CO3	M	M	M	L	M	H
CO4	H	M	L	M	H	M
CO5	H	L	M	H	M	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	L	H	L	L	M	L
CO3	M	L	M	L	H	M
CO4	M	L	H	M	L	M
CO5	H	H	L	H	M	M

Low - L, Medium - M, High - H

**Practical Programs:**

**Hours: 30**

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
  - i. Grade A: Percentage  $\geq 80$
  - ii. Grade B: Percentage  $\geq 70$  and  $< 80$
  - iii. Grade C: Percentage  $\geq 60$  and  $< 70$
  - iv. Grade D: Percentage  $\geq 40$  and  $< 60$
  - v. Grade E: Percentage  $< 40$
3. Program, using user defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Program to display the first n terms of Fibonacci series
5. Program to find factorial of the given number.
6. Program to find sum of the following series for n terms:  $1 - \frac{2}{2!} + \frac{3}{3!} + \dots + \frac{n}{n!}$
7. Program to calculate the sum and product of two compatible matrices.

## SEMESTER - II

### UAAFB23 - ALLIED II: ACCOUNTING FUNDAMENTALS - II

Year: I Sem: II	Course Code	Title of the Course	Course type	Course Category	No. of Hours	Credits	Marks
	UAAFB23	Accounting Fundamentals–II	Theory	Allied	5	4	40+60

#### Course Objectives:

1. To introduce the students with different forms of business and its Accounting Concepts.
2. To teach them to prepare accounts for partnership fundamentals, admission, retirement and death.
3. To practice them with the accounting techniques to prepare accounts for Various Branches, Departments to analyze the profits /Losses.
4. To make students aware about Hire purchase and installments system and make them to prepare accounts.

#### Course Outcomes:

Upon the successful completion of this course the students will have the ability to:

1. Illustrate and build knowledge of Partnership fundamentals and admission of a partner.
2. To solve problems relating to retirement and death of a partner.
3. Do the accounting related to various Branch offices under stock & Debtors and final accounts method.
4. Calculate and reveal the profits/ losses of a Department through Departmental Accounting Techniques.
5. Understand and adopt the rules of Hire purchase and installment system accounting.

#### COs consistency with POs

CO	PO1	PO2	PO3	PO4	PO5	PO6
1	H	H	M	H	H	M
2	H	H	M	H	H	M



<b>3</b>	H	M	H	M	H	M
<b>4</b>	H	M	H	M	M	H
<b>5</b>	H	H	H	H	H	M

(Low– L,Medium– M,High– H)

**COs consistency with PSOs**

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	<b>1</b>	H	H	M	M	M
<b>2</b>	H	H	M	H	H	M
<b>3</b>	H	M	M	M	M	M
<b>4</b>	H	M	M	M	M	H
<b>5</b>	M	H	M	H	H	M

**COURSE SYLLABUS**

**Unit I: Partnership Account–I (Fundamentals & Admission) (15 Hours)**

- 1.1. Definition, Meaning, Partnership deed. (K<sub>1</sub>, K<sub>2</sub>)
- 1.2. Accounts of partnership firm. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 1.3. Partners Capital account (Fixed & Fluctuating). (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 1.4. Admission of a partner- Introduction, Goodwill –meaning, need & Factors affecting the value of Goodwill. (K<sub>1</sub>, K<sub>2</sub>)
- 1.5. Calculation of Sacrificing Ratio and Valuation of Goodwill. (K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)
- 1.6. Problems of Admission of a partner (Capital account and Balance sheet). (K<sub>3</sub>, K<sub>4</sub>)

**Unit II: Partnership Account –II (Retirement & Death) (15 Hours)**

- 2.1. Introduction to Retirement of Partner – Profit Sharing Ratio, Gaining Ratio, Difference between Sacrificing Ratio and Gaining Ratio and Treatment of Goodwill. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 2.2. Problems (Treatment of Goodwill). (K<sub>3</sub>, K<sub>4</sub>)
- 2.3. Comprehensive problems on Retirement of a Partner. (K<sub>2</sub>, K<sub>3</sub>)
- 2.4. Introduction to Death of a partner, Mode of payment. (K<sub>1</sub>, K<sub>2</sub>)
- 2.5. Calculation of Gaining ratio and share of Goodwill. (K<sub>2</sub>, K<sub>3</sub>)
- 2.6. Comprehensive problems on Death of a Partner. (K<sub>3</sub>, K<sub>4</sub>)

**Unit III: Branch Accounts (15 Hours)**

- 3.1. Meaning and objectives of Branch Account. (K<sub>1</sub>, K<sub>2</sub>)
- 3.2. Types of Branch Account. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 3.3. Features of Dependent Branch. (K<sub>1</sub>, K<sub>2</sub>)
- 3.4. Debtors System (Dependent Branch System). (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 3.5. Stock and Debtors System. (K<sub>3</sub>, K<sub>4</sub>)
- 3.6. Final Accounts System. (K<sub>3</sub>, K<sub>4</sub>)

**Unit IV: Departmental Accounting (15 Hours)**

- 4.1. Meaning, Need, Advantages of Departmental Accounting. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 4.2. Difference between Departmental accounts and Branch Accounts, Apportionment of expenses. (K<sub>1</sub>, K<sub>2</sub>, K<sub>3</sub>)
- 4.3. Apportionment of Indirect expenses. Problems (K<sub>2</sub>, K<sub>3</sub>)
- 4.4. Departmental Trading Account (K<sub>2</sub>, K<sub>3</sub>)
- 4.5. Departmental Profit and Loss Account within direct expenses (K<sub>2</sub>, K<sub>3</sub>)
- 4.6. Inter Departmental transfer at cost price. (K<sub>3</sub>, K<sub>4</sub>)

## **Unit V: HirePurchase System**

**(15 Hours)**

- 5.1. Meaning, Definition and characteristic features of Hire purchase. (K<sub>1</sub>, K<sub>2</sub>)
- 5.2. Difference between Hire purchase system and Installment System. (K<sub>3</sub>, K<sub>4</sub>)
- 5.3. Calculation of Interest. (K<sub>2</sub>, K<sub>3</sub>, K<sub>4</sub>)
- 5.4. Journal in the books of buyer and seller. (K<sub>3</sub>, K<sub>4</sub>)
- 5.5. Ledger in the books of both buyer and seller. (K<sub>3</sub>, K<sub>4</sub>)
- 5.6. Default and repossession – Complete repossession. (K<sub>3</sub>, K<sub>4</sub>)

### **Text Books:**

Reddy T.S and Murthy – Advanced Accountancy – Margham Publications, Chennai, Reprint 2018

### **Reference Books**

1. Shukla M.C., Gupta M.P., Agarwal B.M. and Grewal T.S. – Advanced Accounts (Volume I) – S. Chand & Company Limited, New Delhi, Reprint 2019.
2. Nagarajan K.L., Vinayagam N. And Mani P.L. – Principles of Accountancy – Eurasia Publishing House, New Delhi, Revised Edition 2017.
3. Jain S.P., Narang K.L., Mukesh Kumar Sharma, Romila Jain and Satish Khasa – Financial Accounting – Kalyani Publishing House, New Delhi, Reprint 2018.
4. Tulsian P.C. – Financial Accounting – Pearson Education, New Delhi, Edition Reprint – 2017.
5. Raman B.S. – Financial Accounting (Vol-I) - United Publishers and Distributors – Guwahati, Edition 2018.

### **Web Resources:**

1. MIT Open CourseWare (<http://ocw.mit.edu/courses/sloan>)
2. [www.accountingschoolguide.com](http://www.accountingschoolguide.com)
3. [www.edx.org](http://www.edx.org)
4. study.com
5. [www.accountingcoach.com](http://www.accountingcoach.com)
6. fasab.gov
7. [www.freebookcentre.net](http://www.freebookcentre.net)
8. open.umn.edu
9. libguides.uwf.edu
10. books.google.co.in

### SEMESTER III

#### UCCAG23 - DATA STRUCTURES

<b>Year:</b> <b>II</b> <b>Sem:</b> <b>III</b>	<b>Course Code</b>  UCCAG23	<b>Title of the Course</b> Data Structures	<b>Course Type</b>  Theory	<b>Course Category</b>  Core	<b>H/W</b>  5	<b>Credits</b>  4	<b>Marks</b>  40+60
--	-----------------------------------	---	----------------------------------	------------------------------------	---------------------	-------------------------	---------------------------

#### COURSE OBJECTIVES

1. On learning this paper students will gain the knowledge on different types of data along with the structures and its algorithm.
2. To impart the basic concepts of data structures and algorithms
3. To understand concepts about searching and sorting techniques
4. To Understand basic concepts about stacks, queues, lists, trees and graphs
5. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

#### COURSE OUTCOMES

The Learners will be able to

1. Discuss the concept of complexity of algorithms, data types, algorithms, Big O notation.
2. Apply basic data structures such as arrays, linked lists, stacks and queues.
3. Identify problem involving trees and binary search trees.
4. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data using linked list.
5. Analyze graphs and describe the hash function and concepts of collision and its resolution methods.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	M	L	M
CO2	L	M	L	M	L	H

<b>CO3</b>	M	M	H	H	M	L
<b>CO4</b>	H	M	L	M	L	M
<b>CO5</b>	M	L	M	L	L	H

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	H	M	H	H	M
<b>CO2</b>	L	M	H	H	M	L
<b>CO3</b>	H	M	M	H	M	H
<b>CO4</b>	L	H	M	H	L	H
<b>CO5</b>	H	H	H	L	M	M

**Low - L, Medium - M, High - H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours: 15**

- 1.1 Introduction - Data structure operations (K1)
- 1.2 Complexity and Time Space of Algorithms (K2)
- 1.3 Mathematical Notation and Functions - Algorithmic Notation K2)
- 1.4 Control Structures - Complexity of Algorithms - Sub Algorithms - Variables - Data Types (K2)
- 1.5 String Processing: Basic Terminology - Storing Strings (K3)
- 1.6 Character Data Type - String Operations (K2)

### **Unit II**

**Hours: 15**

- 1.1 Linear Arrays Representation in Memory (Cognitive Level: K1)
- 1.2 Traversals (Cognitive Level: K2)
- 1.3 Inserting and Deleting (Cognitive Level: K3)
- 1.4 Sorting – Searching (Cognitive Level: K3)
- 1.5 Multidimensional Arrays (Cognitive Level: K1)
- 1.6 Pointer Arrays. (Cognitive Level: K1)

### **Unit III**

**Hours: 15**

- 3.1 Linked Lists: Representation in Memory - Traversing a Linked List (K1)
- 3.2 Searching – Garbage Collection (K1)
- 3.3 Insertion and Deletion - Headers – Two Way Lists (K3)
- 3.4 Array Representation - Arithmetic Expressions- Recursion (K1)
- 3.5 Queues - Application Circular queues - Priority Queues. (K1.K3)

### **Unit IV**

**Hours: 15**

- 4.1 Trees - Binary Trees - Representation in Memory (K1)
- 4.2 Tree Traversals (K2)
- 4.3 Binary Search Trees (K2)
- 4.4 Searching (K3)
- 4.5 Inserting and Deleting (K2)

#### 4.6 Path Lengths - General Trees (K1)

### Unit V

**Hours: 15**

- 5.1 Graphs - Sequential Representation (K1)
- 5.2 Adjacency Matrix - Path Matrix (K2)
- 5.3 Heap Sort (K1)
- 5.4 Warshall's Algorithm for Shortest Path (K2)
- 5.5 Linked Representation - Graph Traversals (K1)
- 5.6 Hashing (K1)

### Book for Study:

1. Seymour Lipschutz, "Data Structures: Schaum's Outline Series", Revised Edition, McGraw Hill Publication, 2017.

### Reference Books :

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, "Fundamentals of Data Structures in C", 2<sup>nd</sup> Edition, Universities Press Pvt Ltd, 2018
2. Yashavant P. Kanetkar, "Data Structures through C", 2<sup>nd</sup> Edition, BPB Publications, 2003.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", 1<sup>st</sup> Edition, Pearson Education.
4. Dr. Venkata Nagendra, G. Rajesh, "Fundamentals of Data Structures : for beginners", Notion Press, 2020.

### OER:

1. <http://www.freebookcentre.net/ComputerScience-Books-Download/Fundamentals-of-Algorithms-with-Applications.html>
2. <http://www.freebookcentre.net/ComputerScience-Books-Download/Algorithms-and-Data-Structures-Lecture-Materials.html>

### SEMESTER III

#### UCCA23 - JAVA PROGRAMMING

Year: II Sem: III	Course Code	Title of the Course Java Programming	Course Type Theory	Course Category Core	H/W 4	Credits 3	Marks 40+60
----------------------------	----------------	---	--------------------------	----------------------------	----------	--------------	----------------

#### COURSE OBJECTIVES

1. This course provides an introduction to object oriented programming (OOP) using the Java programming language.
2. Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm
3. Concepts of object oriented programming in java are needed.
4. To provide sufficient knowledge about developing real world projects with object oriented concept.
5. To have the knowledge of Exception handling and Event handling and applets.

#### COURSE OUTCOMES

The Learners will be able to

1. Able to understand the use of OOPs concepts.
2. Able to solve real world problems using OOP techniques. To understand the use of polymorphism and Inheritance.
3. Able to understand the use of Packages and Interface in java.
4. Able to develop and understand exception handling, multithreaded applications with synchronization.
5. Able to design GUI based applications and develop AWT and applets for web applications.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	M	L	H

<b>CO2</b>	M	L	H	L	M	M
<b>CO3</b>	L	M	M	M	H	M
<b>CO4</b>	M	M	L	L	M	L
<b>CO5</b>	H	M	H	M	H	L

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	M	H	H	M	L
<b>CO2</b>	L	M	H	M	H	H
<b>CO3</b>	M	H	H	M	L	H
<b>CO4</b>	H	M	M	H	H	L
<b>CO5</b>	M	H	M	L	H	M

**Low - L, Medium - M, High - H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours: 15**

- 1.1 Introduction to Java (K1)
- 1.2 Features of Java (K1)
- 1.3 Lexical issues & Data types (K1)
- 1.4 Variables - Operators (K1)
- 1.5 Type conversion and casting (K2)
- 1.6 Control Statements (K2)

### **Unit II**

**Hours: 15**

- 2.1 Arrays – Strings (K1)
- 2.2 Classes - Objects-Constructors - Overloading method (K2)
- 2.3 Access Control - Static and Fixed method (K2)
- 2.4 Inner Class –String class (K2)
- 2.5 Inheritance - Overriding Method (K3)
- 2.6 Using Super Class. (K2)

### **Unit III**

**Hours: 15**

- 3.1 Input/output: ExPSOring Java i/o: The Java I/O classes (K1)
- 3.2 Interfaces (K2)
- 3.3 File Stream Classes (K2)
- 3.4 Packages (K3)
- 3.5 Access Protection - Importing Packages (K3)
- 3.6 Interfaces (K2)

### **Unit IV**

**Hours: 15**

- 4.1 Exception Handling: try, catch (K1)
- 4.2 Throw and Throws - Finally (K2)
- 4.3 Thread - Creating a Thread (K4)
- 4.4 Multithreading (K2)
- 4.5 Synchronization (K3)
- 4.6 Deadlock. (K2)

**Unit V****Hours: 15**

- 5.1 The Java Applet and (K4)
- 5.2 HTML APPLET tag (K4)
- 5.3 getDocumentBase() and getCodeBase() (K5)
- 5.4 Event Handling (K3)
- 5.5 Working with Windows (K4)
- 5.6 AWT Classes. (K2)

**Book for Study:**

1. Herbert Schildt - "The Complete Reference: Java 2", 12<sup>th</sup> Edition Tata McGraw Hill Publication, 2021.

**Books for Reference:**

1. C. Muthu, "Programming with Java", 2<sup>nd</sup> Edition, Tata McGraw Hill Publishing, 2017.
2. E. Balagurusamy, "Programming with Java: A Primer", 4<sup>th</sup> Edition, Tata McGraw Hill Publication, 2019.
3. Y. Daniel Liang, "Intro to Java Programming", 10<sup>th</sup> Edition, Pearson Education, 2018.

**OER:**

1. <https://www.tutorialspoint.com/java/index.htm>[https://www.tutorialspoint.com/php/php\\_tutorial.pdf](https://www.tutorialspoint.com/php/php_tutorial.pdf)
2. <http://www.freebookcentre.net/JavaTech/javaCategory.html>
3. <http://freecomputerbooks.com/javaCategory.html>



**SEMESTER III**  
**UCCAI23 - PRACTICAL - III: JAVA**

<b>Year: II Sem: III</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCAI23	Practical - III: Java	Practical	Core	2	2	40+60

**COURSE OBJECTIVES**

1. To introduce the object oriented programming concepts.
2. To understand object oriented programming concepts, and apply them in solving problems.
3. To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
4. To introduce the concepts of exception handling and multithreading.
5. To introduce the design of Graphical User Interface using applets and swing controls.

**COURSE OUTCOMES**

The Learners will be able to

1. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and I/O Streams.
2. Establish exception handling is used to minimize the errors in Java programming.
3. Demonstrate the concepts of Packages and Interface.
4. Evaluate the Java programs to implement error handling techniques using exception handling.
5. Design GUI based applications and develops applets for web applications.

<b>CO/PO</b>	<b>PO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

<b>CO1</b>	M	L	M	L	M	H
<b>CO2</b>	H	H	L	M	L	L
<b>CO3</b>	L	M	M	H	M	M
<b>CO4</b>	M	L	L	M	H	M
<b>CO5</b>	H	M	M	L	M	L

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	M	L	H	L	H
<b>CO2</b>	L	H	M	H	H	M
<b>CO3</b>	M	H	H	L	M	H
<b>CO4</b>	H	L	H	L	H	M
<b>CO5</b>	L	M	H	H	H	H

**Low -L, Medium -M, High-H**

### **Practical Program**

**Hours: 40**

1. Implementing String manipulation using character Array.
2. Implementing Input and Output Stream.
3. Implementing Packages and Interface.
4. Implementing Exception handling.
5. Implementing Real time application using multithread.
6. Implementing Applet using Graphics class.
7. Implementing AWT controls.
8. Implementing Colors and fonts.
9. To create any applications using Applets and AWT.

<b>Year: II</b>	<b>Course Code:</b>	<b>Title of the Course:</b>	<b>Course Type:</b>	<b>Course Category:</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
<b>SEM:III</b>	UACAA23	Mathematical Foundations	Theory	Allied	5	5	100

**SEMESTER – III**  
**UACAA23 - ALLIED III: MATHEMATICAL FOUNDATIONS**

**Course Objectives**

1. To provide basic mathematical concepts required for computer applications.
2. To introduce the notion of relations and functions
3. To learn simple methods in algebra

**Course Outcomes (CO)**

The learners will be able to

1. Understand the concepts of Mathematical logic and compute the operators of Symbolic logic.
2. Acquire knowledge about relations and functions.
3. Assess real-life simple problems with permutation, combination, and probability.
4. Know about matrices and their types.
5. Differentiate standard functions.

<b>CO</b>	<b>PSO</b>					
	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>

<b>CO1</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>	<b>H</b>	<b>H</b>
<b>CO2</b>	<b>H</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>L</b>	<b>H</b>
<b>CO3</b>	<b>M</b>	<b>L</b>	<b>H</b>	<b>H</b>	<b>H</b>	<b>H</b>
<b>CO4</b>	<b>M</b>	<b>L</b>	<b>H</b>	<b>H</b>	<b>H</b>	<b>H</b>
<b>CO5</b>	<b>H</b>	<b>H</b>	<b>M</b>	<b>H</b>	<b>H</b>	<b>L</b>

(L-Low (1), M-Moderate(2), H-High(3))

## Course Syllabus

### Unit I: Symbolic logic

**15 hours**

- 1.1 Symbolic logic (K1, K2, K3, K4, K5, K6)
- 1.2 Logical operator (K1, K2, K3, K4, K5, K6)
- 1.3 Conditional and bi-conditional operators (K1, K2, K3, K4, K5, K6)
- 1.4 Converse, Inverse, Contrapositive (K1, K2, K3, K4, K5, K6)
- 1.5 Tautology (K1, K2, K3, K4, K5, K6)
- 1.6 Contradiction (K1, K2, K3, K4, K5, K6)

**Book 1: Ch :1 sec 1.1 to 1.45**

### Unit II: Relations and Functions

**15 hours**

- 2.1 Relation (K1, K2, K3, K4, K5, K6)
- 2.2 Equivalence relation (K1, K2, K3, K4, K5, K6)
- 2.3 Partition relation (K1, K2, K3, K4, K5, K6)
- 2.4 Partial order relation (K1, K2, K3, K4, K5, K6)
- 2.5 Functions, Inverse (K1, K2, K3, K4, K5, K6)
- 2.6 Composition of functions (K1, K2, K3, K4, K5, K6)

**Book 1: Ch :3 sec 3.1 to 3.17 Ch 4: sec 4.1 to 4.9, 4.12 to 4.28**

### Unit III: Probability & Algebra

**15 hours**

- 3.1 Probability (K1, K2, K3, K4, K5, K6)
- 3.2 Probability (simple problems) (K1, K2, K3, K4, K5, K6)
- 3.3 Permutations (K1, K2, K3, K4, K5, K6)
- 3.4 combinations (K1, K2, K3, K4, K5, K6)
- 3.5 Combination contd., (K1, K2, K3, K4, K5, K6)
- 3.6 Boolean algebra (K1, K2, K3, K4, K5, K6)

**Book 1: Ch:7 sec 7.1 to 7.49**

### Unit IV: Matrices

**15 hours**

- 4.1 Types of matrices (K1, K2, K3, K4, K5, K6)
- 4.2 Matrix operations, Symmetric and skew-symmetric (K1, K2, K3, K4, K5, K6)
- 4.3 Hermitian, skew-Hermitian and Orthogonal Matrix (K1, K2, K3, K4, K5, K6)
- 4.4 Unitary matrix (K1, K2, K3, K4, K5, K6)
- 4.5 Rank of a matrix (K1, K2, K3, K4, K5, K6)
- 4.6 Cramer's rule (K1, K2, K3, K4, K5, K6)

**Book 1: Ch: 8 sec 8.1 to 8.12 8.20 to 8.24**

**Book 2: Ch: 4 sec 3, 5, 9, 10**

**Unit V:Differential calculus**

**15 hours**

- 5.1 Differentiation of standard function  $x^n$  (K1, K2, K3, K4, K5, K6)
- 5.2 Differentiation of standard function  $e^x$  (K1, K2, K3, K4, K5, K6)
- 5.3 Differentiation of standard function  $\log x$  (K1, K2, K3, K4, K5, K6)
- 5.4 Differentiation of standard functions  $\sin x$ ,  $\cos x$ ,  $\tan x$  (K1, K2, K3, K4, K5, K6)
- 5.5 Chain Rule (K1, K2, K3, K4, K5, K6)
- 5.6 Successive differentiation (up to the second derivative) (K1, K2, K3, K4, K5, K6)

**Book 2: Ch: 6 sec 6.1 to 6.6**

**Text Books:**

1. P.R.Vittal-Mathematical Foundations- 2<sup>nd</sup> Edition (Reprint 2023), Margham Publications, Chennai.
2. PA. Navanitham -Business Statistics-Jai publishers, Trichy-21, October 2020.

**Reference Books:**

1. P.R. Vittal - Allied Mathematics – Margham Publications - Third Edition, 2002
2. M.K.Venkataraman - Engineering Mathematics, Volumes I and II - The National Publication Co.,  
Madras, 1992 and 1993.

**E- Resources**

1. [https://mrcet.com/downloads/digital\\_notes/IT/MATHEMATICAL%20FOUNDATIONS%20OF%20\(R17A0503\).pdf](https://mrcet.com/downloads/digital_notes/IT/MATHEMATICAL%20FOUNDATIONS%20OF%20(R17A0503).pdf)
2. [https://nios.ac.in/media/documents/SrSec311NEW/311\\_Maths\\_Eng/311\\_Maths\\_Eng\\_Lesson11.pdf](https://nios.ac.in/media/documents/SrSec311NEW/311_Maths_Eng/311_Maths_Eng_Lesson11.pdf)
3. [https://www.google.co.in/books/edition/Introduction\\_to\\_Matrices\\_and\\_Vectors/24PCA9AAQBAJ?hl=en&gbpv=1](https://www.google.co.in/books/edition/Introduction_to_Matrices_and_Vectors/24PCA9AAQBAJ?hl=en&gbpv=1)
4. <https://www.mathcentre.ac.uk/resources/Refresher%20Booklets/basic%20diff%20refresh1Emathcentre/final0203-ltsn-basicediff.pdf>

### SEMESTER III

#### USCAA320 - SKILL BASED ELECTIVE: ACCOUNTING SOFTWARE

Year: II Sem: III	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
	USCAA320	SBE: Accounting Software	Theory with Practical	Skill	2	2	40+60

#### COURSE OBJECTIVE

1. To seamlessly combine the activities of accounting, inventory, payroll, finance and more.
2. To maintain a record of all monetary transactions.
3. To apply the knowledge of quantitative tools & techniques in the interpretation of data for managerial decision – making.
4. To develop computer skills of recording financial transactions, preparation of annual accounts and reports using Tally.
5. To acquaint with the accounting concept, tools and techniques influencing business organization.

#### COURSE OUTCOMES

The Learners will be able to

6. Understand the basics in Tally and company creations
7. Creating vouchers, ledgers accounts, Balance Sheet
8. Demonstrate Profit And Loss Account and Reconciliation of the bank account.
9. Create company accounts that use various functions like Cost Category and Cost Centre
10. Learn to apply the tools & techniques in the interpretation of data for managerial decision – making.

CO/PO	PO
-------	----

	1	2	3	4	5	6
<b>CO1</b>	M	M	M	H	H	L
<b>CO2</b>	L	M	L	M	L	H
<b>CO3</b>	L	M	H	M	M	M
<b>CO4</b>	H	L	M	M	H	M
<b>CO5</b>	L	M	M	L	M	L

<b>CO/PSO</b>	<b>PSO</b>					
	1	2	3	4	5	6
<b>CO1</b>	H	M	H	M	H	L
<b>CO2</b>	L	H	M	H	H	L
<b>CO3</b>	H	L	H	H	M	M
<b>CO4</b>	M	M	H	H	L	H
<b>CO5</b>	H	H	L	M	M	H

**Low - L, Medium - M, High - H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours: 5**

- 1.1 Company Creation and Configuration : Creation for New Company(K1,k2)
- 1.2 Company Features Accounting Features (K1,k2)
- 1.3 Inventory Features – Configuring Tally (K1,k2,k6)
- 1.4 Configuring Voucher Entry (k5,k6)
- 1.5 Configuring Invoice/Orders Entry – Shut A Company(k4,k5)
- 1.6 Alter a Company – Delete a Company(K4,k5)

### **Unit II**

**Hours: 5**

- 2.1 Accounting and Inventory an Outline : Fundamentals of Accounting – Accounting Terms Definitions – Ledger and Ledger Accounts (K2,K3)
- 2.2 Trial Balance – Trading and Profit and Loss Account (K1,K2)
- 2.3 Profit and Loss Account – Balance Sheet – Fundamentals of Inventory (K1, K2)
- 2.4 Accounts Masters Creation: Accounts Information – Group (Create, Display, Delete) Multiple Groups (K1,K2)
- 2.5 Ledgers (Create, Display, Alter) – Multiple Ledgers (K2, K4, K5)
- 2.6 Cost Categories – Cost Centres. (K5, K6)

### **Unit III**

**Hours: 6**

- 3.1 Inventory Master Creation: Stock Groups – Entering Vouchers (K1,K2,K4)
- 3.2 Voucher Types –Voucher Entry (K3, K4)
- 3.3 Different Types of Accounting Vouchers(Payment/Receipt, Journal, Sales , Purchase) (K2,K3,K4)
- 3.4 Reports In Tally: Display Balance Sheet – Profit And Loss Account (K3,K4,K5)
- 3.5 Display Trial Balance – Day Book (K2,K3,K4)
- 3.6 Reconciliation of Bank Accounts. (K5,K6)

### **Unit IV**

**Hours: 6**

1. Trading , Profit and Loss Account of a Company

2. Balance Sheet of a Company
3. Cost Category and Cost Centre

### Unit V

**Hours: 6**

4. Bank Reconciliation Statement
5. Inventory and Stock
6. Display and Reporting

### Books for Study:

1. LP Computer Series - Guide To Tally 9 - Law Point, Kolkata, First Edition, 2007.

### Books for Reference:

1. Tally for Beginners - Tally Press.
2. Manoj Bansal, Jay Sharma, "Computerized Accounting System", Sahitya Bhawan Publications, 2018.

### OER:

1. <https://tallysolutions.com/learning-hub/#gref>
2. <https://www.udemy.com/course/tally-erp-9-complete-course-beginners-to-advanced/>

## SEMESTER IV

### UCCAJ23 - DATA COMMUNICATIONS AND NETWORKING

Year: II	Course Code	Title of the Course Data Communications and Networking	Course Type	Course Category	H/W	Credits	Marks
Sem: IV	UCCAJ23		Theory	Core	5	4	40+60

### COURSE OBJECTIVES

1. To discuss and explain about basics of data communication and networking concepts.
2. To introduce analysis and design of computer and communication networks.
3. Understand the network layered architecture and the protocol stack.
4. Design the basic configuration of routers and switches.
5. Resource sharing in the computer network to provide high Reliability.

### COURSE OUTCOMES

The Learners will be able to

1. Describe the Functions of each layer in OSI and TCP/IP Model.
2. Explain the types of Transmission Media with Real-Time Applications.
3. Apply Time and Frequency concept of analysis.
4. Manage Network functions for an Organization.
5. Analyze various Routing Algorithms and Protocols.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	H	M	M	H
CO2	H	M	M	L	M	M



<b>CO3</b>	M	L	M	H	M	L
<b>CO4</b>	H	M	L	M	M	H
<b>CO5</b>	L	M	L	M	L	M

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	L	H	H	M	H
<b>CO2</b>	L	H	L	L	M	L
<b>CO3</b>	M	L	M	L	H	M
<b>CO4</b>	H	L	H	H	L	M
<b>CO5</b>	H	M	L	H	M	M

**Low - L, Medium - M, High - H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours: 14**

- 1.1 Data Communications, Data Networking, and the Internet: Data Communications and Networking for Today's Enterprise - Communications Model.(K1, K2)
- 1.2 Data Communications - Networks - The Internet. (K2, K3)
- 1.3 Protocol Architecture, TCP/IP, and Internet - Based Applications: The Need for Protocol Architecture. (K2, K3)
- 1.4 The TCP/IP Protocol Architecture –The OSI Model. (K3, K4)
- 1.5 Standardization within a Protocol Architecture - Traditional Internet (K2, K3)
- 1.6 Data Transmission: Concepts and Terminology - Analog and Digital Data Transmission - Transmission Impairments (K2, K3)

### **Unit II**

**Hours: 16**

- 2.1 Transmission Media: Guided Transmission Media. (K3)
- 2.2 Wireless Transmission - Wireless Propagation (K3)
- 2.3 Signal Encoding Techniques: Digital Data, Digital Signals - Digital Data, Analog Signals. (K3, K4)
- 2.4 Analog Data, Digital Signals - Analog Data, Analog Signals. (K3)
- 2.5 Digital Data Communication Techniques: Asynchronous and Synchronous Transmission - Types of Errors (K2, K3, K4)
- 2.6 Error Detection. Error Correction (K2,K3)

### **Unit III**

**Hours: 14**

- 3.7 Data Link Control Protocols: Flow Control - Error Control. (K2)
- 3.8 High Level Data Link Control (HDLC). (K3)
- 3.9 Multiplexing: Frequency Division Multiplexing - Synchronous Time Division Multiplexing - Statistical Time Division Multiplexing. (K3, K4)
- 3.10 Asymmetric Digital Subscriber Line –xDSL.(Cognitive Level: K2, K3)
- 3.11 Spread Spectrum: The Concept of Spread Spectrum - Frequency Hopping Spread Spectrum. (K3, K4, K5)

3.12 Direct Sequence Spread Spectrum – Code Division Multiple Access. (K3, K4, K5)

**Unit IV**

**Hours: 16**

- 4.1 Circuit Switching and Packet Switching: Switched Communications Networks - Circuit Switching Networks. (K2, K4)
- 4.2 Circuit Switching Concepts - Softswitch Architecture. (K2, K4)
- 4.3 Packet Switching Principles - X.25 - Frame Relay. (K4, K5)
- 4.4 Asynchronous Transfer Mode: Protocol Architecture. (K4)
- 4.5 ATM Logical Connections - ATM Cells - Transmission of ATM Cells. (K5)
- 4.6 ATM Service Categories. (K4, K5)

**Unit V**

**Hours: 15**

- 5.1 Routing in Switched Networks: Routing in Packet Switching Networks - Examples: Routing in ARPANET. (K2, K3)
- 5.2 Least Cost Algorithms. (K3, K4)
- 5.3 Effects of Congestion - Congestion Control.( K4)
- 5.4 Traffic Management - Congestion Control in Packet Switching Networks.(K4, K5, K6)
- 5.5 Frame Relay Congestion Control - ATM Traffic Management. (K5, K6)
- 5.6 ATM/GFR Traffic Management. (K5, K6)

**Book for Study:**

1. William Stallings, “Data and Computer Communications”, 10<sup>th</sup> Edition , Pearson Education, Inc., 2017.

**Books for Reference:**

1. Andrews S. Tanenbaum, “Computer Networks”, 5<sup>th</sup> Edition , Prentice Hall of India Private Limited, 2011
2. Leon Garcia and Widjaja, “Communication Networks, Fundamental Concepts and Key Architecture “, 2<sup>nd</sup> Edition, Tata McGraw Hill, 2005.
3. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition, Tata McGraw Hill, 2017.

**OER:**

1. <http://www.freebookcentre.net/Networking/networkCategory.html>
2. <http://freecomputerbooks.com/networkCategory.html>

**SEMESTER IV**  
**UCCA23 - PRACTICAL IV: LINUX**

<b>Year: II Sem: IV</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCA23	Practical IV: LINUX	Practical	Core	4	5	40+60

**COURSE OBJECTIVES**

1. To describe basic components of operating system.
2. To understand basic principles used in the design of modern operating systems.
3. To illustrate the general architecture of computers.
4. To Understand and analyze theory.
5. To analyze: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O.

**COURSE OUTCOMES**

The Learners will be able to

1. Acquire the important computer system resources and the role of operating system in their management policies and algorithms
2. Understand the process management policies and scheduling of processes by CPU.
3. Evaluate the requirement for process synchronization and coordination handled by operating system
4. Become familiar with the C language, gcc compiler, and make files to understand the high-level structure of the Linux kernel.
5. Understand the high-level structure of the Linux kernel both in concept and source code.

<b>CO/PO</b>	<b>PO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>

<b>CO1</b>	L	M	L	M	M	L
<b>CO2</b>	H	M	M	L	L	M
<b>CO3</b>	M	H	M	M	L	M
<b>CO4</b>	L	M	L	M	M	L
<b>CO5</b>	L	L	H	M	M	L

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	L	H	H	M	H
<b>CO2</b>	L	H	L	L	M	L
<b>CO3</b>	M	H	M	L	L	M
<b>CO4</b>	H	L	H	H	L	M
<b>CO5</b>	H	M	L	H	M	M

**Low - L, Medium - M, High - H**

## **COURSE SYLLABUS**

### **PRACTICAL:**

1. Basic Commands: Directory and File Commands: pwd, ls, cd, cp, mv, rm, mkdir, rmdir, chmod.
2. Write a shell script to find the factorial of a given number.
3. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
4. Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions.
5. Write a C program that makes a copy of a file using standard I/O and system calls.
6. Implement in C the following Linux commands using system calls:
  - a. (a) cat (b) ls (c) mv .
7. Write a C program to list every file in a directory, its inode number and file name.
8. Write a C program that implements a producer-consumer system with two processes (using semaphores).

## SEMESTER – IV

### UACAB23- ALLIED IV: STATISTICAL METHODS

<b>Year: II</b>	<b>Course Code:</b>	<b>Title of the Course:</b>	<b>Course Type:</b>	<b>Course Category:</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
<b>SEM: IV</b>	<b>UACAB23</b>	Statistical Methods	Theory	Allied	5	5	100

#### Course Objectives

1. To enrich the knowledge of students on statistical methods which play a major role in computer applications
2. To demonstrate sampling techniques and to employ statistical methods of analysis to make inference

#### Course Outcomes (CO)

The learners will be able to

1. Analyze the statistical data using measures of central tendency and graphs.
2. Provide an overall description of a set of data using measures of dispersion.
3. Apply the concept of regression and correlation in business problems.
4. Make decisions using hypothesis testing.
5. Apply the Chi-square test for independence as well as goodness of fit.

CO	PSO					
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	M	H	H
CO2	H	H	M	L	H	H

CO3	M	L	H	H	H	H
CO4	M	H	H	H	H	L
CO5	H	H	H	M	L	H

(L-Low, M-Moderate, H-High )

## Course Syllabus

### Unit 1: Introduction of Statistics and Measurements of Central Tendency 15 hours

- 1.1 Definition of Statistics, Classification, and Tabulation (K1, K2, K3, K4, K5, K6)
- 1.2 Graphical representation of numerical data (K1, K2, K3, K4, K5, K6)
- 1.3 Formation of a frequency distribution (K1, K2, K3, K4, K5, K6)
- 1.4 Mean and its types (K1, K2, K3, K4, K5, K6)
- 1.5 Median and its types (K1, K2, K3, K4, K5, K6)
- 1.6 Mode and its types ( K1, K2, K3, K4, K5, K6)

**Ch:1 sec:1.1 to 1.2 Ch:3 sec 3.1 to 3.10 Ch:4 sec 4.1 to 4.20 Ch 5: sec 5.1 to 5.22**

### Unit II: Measures of Dispersion 15 hours

- 2.1 Basic Definition of Measures of Dispersion (K1, K2, K3, K4, K5, K6)
- 2.2 Sums on range (K1, K2, K3, K4, K5, K6)
- 2.3 Sums on quartile deviation (K1, K2, K3, K4, K5, K6)
- 2.4 Sums on Mean deviation about the mean (K1, K2, K3, K4, K5, K6)
- 2.5 Sums on Mean deviation about the median (K1, K2, K3, K4, K5, K6)
- 2.6 Sums on Standard deviation (K1, K2, K3, K4, K5, K6)

**Ch:6 sec 6.1 to 6.10, 6.21 to 6.35**

### Unit III: Correlation and Regression 15 hours

- 3.1 Definitions of Correlation (K1, K2, K3, K4, K5, K6)
- 3.2 Types of Correlation (K1, K2, K3, K4, K5, K6)
- 3.3 Karl Pearson's Co-efficient of correlation (K1, K2, K3, K4, K5, K6)
- 3.4 Bivariate Correlation (K1, K2, K3, K4, K5, K6)
- 3.5 Spearman Rank Correlation (K1, K2, K3, K4, K5, K6)
- 3.6 Regression equations (K1, K2, K3, K4, K5, K6)

**Ch:13 sec 13.1,13.2,13.16 to 13.45, Ch 14: sec 14.1,14.3 to 14. 20**

### Unit IV: Tests of Hypothesis 15 hours

- 4.1 Basic definition of hypothesis (K1, K2, K3, K4, K5, K6)
- 4.2 Test for single and difference between means (K1, K2, K3, K4, K5, K6)
- 4.3 Test for single standard deviation and difference standard deviation (K1, K2, K3, K4, K5, K6)
- 4.4 Test for small correlation coefficient (K1, K2, K3, K4, K5, K6)
- 4.5 Small samples-Test for single and difference between means (K1, K2, K3, K4, K5, K6)
- 4.6 Paired t-test (K1, K2, K3, K4, K5, K6)

**Ch 24: sec 24.1 to 24.49 Ch 25: sec 25.1 to 25.4 Ch 26: sec 26.1 to 26.30, 26.33 to 26.40**

## Unit V: Chi-Square Test and Goodness of Fit

15 hours

- 5.1 Definitions of Chi-Square test (K1, K2, K3, K4, K5, K6)
- 5.2 Properties (K1, K2, K3, K4, K5, K6)
- 5.3 Sums on Chi-Square test (K1, K2, K3, K4, K5, K6)
- 5.4 Goodness of Fit (K1, K2, K3, K4, K5, K6)
- 5.5 Contingency table (K1, K2, K3, K4, K5, K6)
- 5.6 Test for Independence of Attributes (K1, K2, K3, K4, K5, K6)

**Ch 28: sec 28.1 to 28.36**

### Text Book:

1. P. R. Vittal and V. Malini - Statistical and Numerical Methods, 1<sup>st</sup> Edition - Margham Publications, 2007.

### Reference Books:

1. P. R. Vittal-Mathematical Statistics, 1<sup>st</sup> Edition-Margham Publications, 2002.
2. S. C. Gupta and V. K. Kappor - Fundamentals of Mathematical Statistics, 3<sup>rd</sup> Edition, Sultan Chand and Sons, 2004.
3. P. Kandasamy and K. Thilagavathy - Calculus of Finite Differences and Numerical Analysis, 1<sup>st</sup> Edition - Margam Publications, 2003.

### E- Resources :

1. <https://egyankosh.ac.in/bitstream/123456789/65182/3/Unit-3.pdf>
2. <https://byjus.com/maths/dispersion/>
3. <https://rcub.ac.in/econtent/ug/bcom/sem4/Business%20Statistics%20Unit%204%20Correlation%20and%20Regression.pdf>
4. <https://courses.lumenlearning.com/introstats1/chapter/goodness-of-fit-test/>

**SEMESTER IV**  
**SKILL BASED ELECTIVE**

**USCSB420 – SBE: DESIGN AND ANIMATION**

<b>Year:</b> <b>II</b> <b>Sem:</b> <b>IV</b>	<b>Course Code</b>  USCSB420	<b>Title of the Course</b>  Design and Animation	<b>Course Type</b>  Practical	<b>Course Category</b>  Skill	<b>H/W</b>  2	<b>Credits</b>  2	<b>Marks</b>  25+35
---	------------------------------------	--	-------------------------------------	-------------------------------------	---------------------	-------------------------	---------------------------

**COURSE OBJECTIVES**

1. To provide knowledge about the latest computer animations like Photoshop and Flash.
2. Enables the students to develop and manage pictures, changing the colors, animation and different Tweening options.
3. Identify the categories of Tools and Identify each tools corresponding keyboard shortcut.
4. Design, Manipulate and customize palettes.
5. To create animated graphics, add sound and interactivity.

<b>CO/PO</b>	<b>PO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	M	L	M	L	L
<b>CO2</b>	L	M	M	L	L	M
<b>CO3</b>	M	H	M	M	H	M
<b>CO4</b>	L	M	L	M	M	L
<b>CO5</b>	L	L	M	M	H	L



CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	L	H	L	M	M	L
CO3	M	L	M	L	H	M
CO4	H	L	M	H	L	M
CO5	M	H	L	H	M	L

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I

Hours: 6

- 1.1 Introduction to Multimedia (K1)
- 1.2 The Elements of Multimedia System (K2)
- 1.3 Benefits of using Multimedia (K2)
- 1.4 Multimedia Platforms: Multimedia Hardware (K2)
- 1.5 System Software - Future Directions. (K1,K2)
- 1.6 Storage for Multimedia: Choice of Storage - Magnetic Media - Optical Media (K3)

### Unit II

Hours: 5

- 2.1 Introduction - Bitmaps and Vectors (K1)
- 2.2 Toolbox: Selection tools - Painting tools - Editing tools - Retouching Tools (K2)
- 2.3 Colours setting (K3)
- 2.4 Layers: Working with Layers - Layer Styles - Locking Layers - Merging Layers (K2)
- 2.5 Managing Layers Components (K2)
- 2.6 Palettes(K1)

### Unit III

Hours :5

- 3.1 Introduction flash (K1)
- 3.2 Basics - Creating objects - Editing objects - Color and text (K2)
- 3.3 Symbols and instances - Library (K2)
- 3.4 Text Animation – Motion Tweening- Shape (K2)
- 3.5 Tweening - Motion Guide - Movie Clip (K2)
- 3.6 Working with ActionScript (K3)

### Unit IV

Hours :7

- 4.1 Create an Action in Photoshop.
- 4.2 Color Transformation Using Photoshop.
- 4.3 Design a Book Cover in Photoshop.
- 4.4 Create an Animation using Photoshop.

### Unit V

Hours :7

- 5.1 Traffic Light Control Using ActionScript in Flash.
- 5.2 Create a Slide Show Presentation in Flash.
- 5.3 Design a Greeting Card Using Button in Flash.
- 5.4 Create a Public Service Awareness Using ActionScript in Flash.

**Books for Study:**

1. Jeffcoate Judith – Multimedia in Practice – Pearson Education, 2009.
2. Photoshop CS6 in Simple Steps Paperback – Kogent Learning Solutions Inc , 2013.
3. Flash CS6 in Simple Steps – Kogent Learning Solutions Inc., Dreamtech Press Publication, 2013.
4. Chris Grover with E.A.Vander Veer-Flash CS4-Pogue Press O'Reilly,2008.

**OER:**

1. <https://www.geeksforgeeks.org/introduction-to-macromedia-flash-8/>
2. <https://www.photoshopenessentials.com>
3. <https://www.javatpoint.com/photoshop>

**SEMESTER V****UCCAL23 - RELATIONAL DATABASE MANAGEMENT SYSTEMS**

Year: III Sem: V	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
	UCCAL23	Relational Database Management Systems	Theory	Core	5	3	40+60

**COURSE OBJECTIVES**

1. The objective of this course is to expose the students to the fundamentals & basic concepts in relational Data Base Management Systems.
2. This course discusses architecture of Database Systems with concept of relational model & ER model.
3. This course explains techniques for database design, Normalization and database recovery and protection.
4. To understand and apply database normalization principles.
5. To analyze the database transaction management, database recovery, security.

**COURSE OUTCOMES (COS)**

The Learners will be able to

1. Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS
2. Write the SQL commands to create tables and Triggers, insert/update/delete data, and query data in a relational DBMS.
3. Analyze and Design a database based on a data model considering the normalization to a specified level.
4. Apply the storage size of the database and design appropriate storage techniques.
5. Analyze the requirements of transaction processing, concurrency control Analyze and XML Structure

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	H	H
CO2	L	H	L	M	L	M
CO3	L	M	M	H	L	M
CO4	L	H	L	M	H	M
CO5	M	L	M	H	M	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	L	H	L
CO2	L	M	L	H	M	H
CO3	M	H	L	H	L	H
CO4	L	M	H	H	M	L
CO5	M	H	M	H	H	M

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I:

Hours: 15

- 1.1 File System vs. DBMS Database System Applications (K1)
- 1.2 View of Data Database language - Data Storage & Querying (K1)
- 1.3 Data Architecture - Database Users and Administrators (K1, K2)
- 1.4 Relational Model - Structure of Relational Databases (K3)
- 1.5 Database Schemas -Relational Query Languages (K2)
- 1.6 Relational Operations. (K3)

### Unit II:

Hours: 15

- 2.1 Introduction to SQL:SQL Data Definition Basic Structure (K1)
- 2.2 Additional Basic Operations - Set Operations (K3)
- 2.3 Aggregate Functions - Null Values - Nested Sub queries (K1)
- 2.4 Modification of the Database; Intermediate SQL Join Expressions (K4)
- 2.5 Views Transactions - Integrity Constraints (K3)
- 2.6 SQL Data Types and Schemas -Advanced SQL Triggers.( K1)

### Unit III:

Hours: 15

- 3.1 Database Design and the E\_R Model :Entity Relationship Model (K1)
- 3.2 Constraints Removing - Redundant Attributes ER Diagrams (K2)
- 3.3 Reduction to Relational Schemas - ER Design Issues - Extended ER Features (K1)
- 3.4 Alternative Notations for Modeling Data; (K1)
- 3.5 Functional Dependencies (K2)
- 3.6 Normalization using Functional Dependencies (K4)

### Unit IV:

Hours: 15

- 4.1 Storage and File Structure: Overview of Physical Storage Media (K1)
- 4.2 Magnetic disks - File Organization (K2)
- 4.3 Organization of records in Files (K3)
- 4.4 Data Dictionary (K2)

4.5 Storage Ordered Indices (K3)

4.6 B+ Tree Index Files. (K2)

**Unit V:**

**Hours: 15**

5.1 Distributed Databases : Homogeneous and Heterogeneous Databases (K2)

5.2 Distributed Data Storage (K1)

5.3 Distributed Transactions - Commit - Protocols -Concurrency Control (K3)

5.4 Object Based Databases (K1)

5.5 Complex Data types - Structured Types and Inheritance in SQL (K3)

5.6 Object identity and ReferenceTypes in SQL (K2)

**Book for Study:**

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan “Database System Concepts”, Seventh Edition, McGraw Hill, 2020.

**Books for Reference:**

1. R Elmasri, S.B. Navathe - “Fundamentals of Database Systems”, Seventh Edition - Pearson Education/Addison Wesley, 2016.
2. C.J.Date, A. Kannan and S.Swamynathan - “An Introduction to Database System”, Eighth Edition - Pearson Education, 2006.
3. Raghuram Ramkrishnan, Johannes Gehrke,” Database Management Systems”, 3<sup>rd</sup> Edition, McGraw Hill Education, 2014.

**OER:**

1. <http://freecomputerbooks.com/dbCategory.html>
2. <http://www.freebookcentre.net/Database/dbCategory.html>

**SEMESTER V**  
**UCCAM23 - SOFTWARE ENGINEERING**

<b>Year: III Sem: V</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCAM23	Software Engineering	Theory	Core	5	5	40+60

**COURSE OBJECTIVES**

1. On learning this paper students will gain the knowledge of developing software with its techniques.
2. To identify the minimum requirements for the development of application.
3. To develop, maintain efficient, reliable and cost effective software solutions.
4. Ability to critically thinking and evaluate assumptions and arguments.
5. To analyze the test case design and test automation.

**COURSE OUTCOMES**

The Learners will be able to

1. Apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and dePSOyment.
2. Discuss the function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
3. Manage the time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.
4. Understand architectural design in order to minimize the risks and errors.
5. Test the techniques for ensuring high quality software and Understand the capabilities of cost estimation.

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	M	L	H	L	M
CO2	L	M	M	L	M	L
CO3	L	M	L	H	M	M
CO4	M	L	M	L	H	M
CO5	L	H	L	M	L	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	M	H	H	L
CO2	M	H	L	M	H	M
CO3	L	M	H	H	L	M
CO4	H	L	H	H	M	L
CO5	L	H	M	H	L	M

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 Introduction: Professional Software Development (K2)
- 1.2 Software Engineering Ethics (K1)
- 1.3 Software Process Model (K2)
- 1.4 Process Activities (K2)
- 1.5 Coping with Changes (K2)
- 1.6 Process Improvement (K2)

### Unit II

Hours: 15

- 2.1 Agile Software Development: Methods – Development Techniques (K2)
- 2.2 Scaling Agile Methods (K2)
- 2.3 Requirement Engineering: Functional and Non Functional Requirements (K2)
- 2.4 Requirement Engineering Processes – Requirements Elicitation (K2)
- 2.5 Requirements Specification (K2)
- 2.6 Requirements Validation and Changes (K2)

### Unit III

Hours :15

- 3.1 System Model: Context Models – Interaction Models (K2)
- 3.2 Structural Models (K2)
- 3.3 Behavioural Models (K2)
- 3.4 Architectural Design: Decisions - Views (K2)
- 3.5 Architectural Patterns (K2)
- 3.6 Application Architecture (K2)

### Unit IV

Hours: 15

- 4.1 Design and Implementation: Object-Oriented Design using the UML (K2)
- 4.2 Design Patterns – Implementation Issues (K2)
- 4.3 Software Testing: Development Testing (K2)
- 4.4 Test-Driven Development (K2)

4.5 Release Testing (K2)

4.6 User Testing (K2)

## **Unit V**

**Hours:15**

5.1 Software Evolution: Evolution Process (K1)

5.2 Legacy Systems (K2)

5.3 Software Maintenance (K2)

5.4 Dependable Systems (K2)

5.5 Dependability Properties (K2)

5.6 Sociotechnical Systems (K2)

### **Book for Study:**

1. Ian Sommerville, "Software Engineering", Edition 10, Pearson Education, 2017.

### **Books for Reference:**

1. Roger S.Pressman, "Software Engineering: A Practitioner's Approach", Edition 7, McGraw Hill, New York, 2019.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Edition 3, Narosa Publication, 2018.
3. Bruce R, "Software Engineering" 8<sup>th</sup> Edition, McGraw Hill, New York, 2019.

### **OER:**

1. [www.freebookcentre.net/SoftwareEng/Free-Software-Engineering-Books-Download.html](http://www.freebookcentre.net/SoftwareEng/Free-Software-Engineering-Books-Download.html)
2. <http://freecomputerbooks.com/softwareCategory.html>

## SEMESTER V

### UCCAN23 - MOBILE APPLICATION DEVELOPMENT

Year: III Sem: V	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
	UCCAN23	Mobile Application Development	Theory	Core	4	3	40+60

#### COURSE OBJECTIVES

1. To study about the android architecture and the tools for developing android applications.
2. To create an android application.
3. To learn about the user interfaces used in android applications.
4. To learn about how to handle and share android data.
5. To learn about how to develop an android services and to publish android application for use.

#### COURSE OUTCOMES

The Learners will be able to

1. Understanding of Android and Android SDK and know about its development environment. Recognize the architecture of Android and its tools. Analyze Eclipse and Android Development Tools(ADT).
2. Understanding of the specific requirements, possibilities and challenges when developing for a mobile context.
3. Understanding of the interaction between user interface and underlying application infrastructure.
4. Define to plan and carry out a design work including developing a prototype that can be evaluated with a specified user group.
5. Develop practical skills and knowledge to construct software for a mobile application and the ability to reflect over possibilities and demands in collaborative software



development.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	M	M	L	H	M
CO2	H	L	L	M	M	L
CO3	L	M	L	H	M	H
CO4	M	H	M	M	L	M
CO5	L	M	L	L	H	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	H	H	M	H
CO2	L	H	M	H	H	H
CO3	H	L	M	H	L	M
CO4	H	M	L	M	H	H
CO5	M	H	H	L	H	H

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 Introduction- Android-Android Versions - Features of Android (K1)
- 1.2 Architecture of Android Obtaining the Required Tools-Android SDK (K2)
- 1.3 Installing the Android SDK Tools Configuring the Android SDK Manager –Eclipse (K2)
- 1.4 Android Development Tools (ADT)-Creating Android Virtual Devices (AVDs)- Creating Your First Android Application (K5)
- 1.5 Types of Android Application (K2)
- 1.6 Anatomy of an Android Application.(K2)

### Unit II

Hours: 15

- 2.1 Activities, Fragments and Intents-Understanding Activities (K2)
- 2.2 Linking Activities Using Intents (K1)
- 2.3 Fragments-Adding Fragments Dynamically-Life Cycle of a Fragment (K1, K2)
- 2.4 Interactions between Fragments-Calling Built-In Applications Using Intents (K1)
- 2.5 Understanding the Intent Object-Using Intent Filters (K2)
- 2.6 Adding Categories-Displaying Notifications.(K3)

### Unit III

Hours: 15

- 3.1 Android User Interface-Understanding the Components of a Screen(K1, K3)
- 3.2 Adapting to Display Orientation (K2)
- 3.3 Managing Changes to Screen Orientation(K2)
- 3.4 Utilizing the Action Bar (K3)
- 3.5 Creating the User Interface Programmatically (K5)
- 3.6 Listening for UI Notifications. (K4)

### Unit IV

Hours: 15

- 4.1 Databases-Content Providers and Messaging-Saving and Loading User Preferences

- (K1, K3)
- 4.2 Persisting Data to Files(K2)
  - 4.3 Creating and Using Databases-Content Providers (K2)
  - 4.4 Sharing Data in Android-Using a Content Provider-Creating Your Own Content (K2, K3)
  - 4.5 Providers-Using the Content Provider (K4)
  - 4.6 Messaging-SMS Messaging-Sending E-mail. (K2)

## **Unit V**

**Hours: 15**

- 5.1 Android-lifecycle:activity-lifecycle (K1, K2)
- 5.2 Life cycle concepts (K2)
- 5.3 lifecycle callbacks-onCreate()-onStart()-onResume()-onRestart()(K1, K2)
- 5.4 onPause()-onStop()-onDestroy()(K1, K2)
- 5.5 ios lifecycle – (K5)
- 5.6 DePSOyment methodologies (K5)

### **Book for Study:**

1. Wei Meng Lee, “Beginning Android 4 Application Development”, John Wiley & Sons Inc,1<sup>st</sup> Edition Inc, 2012.
2. Reto Meier, “Professional Android 4 Application Development”, John Wiley & Sons Inc, 1<sup>st</sup> Edition, 2012.

### **Books for Reference:**

1. ZigurdMednieks, Laird Dornin, Blake Meike G, and Masumi Nakamura, “Programming Android”, O’Reilly Inc, 2<sup>nd</sup> Edition, 2012.
2. OnurCinar, “Android Apps with Eclipse”, Apress, Springer (India) Private Limited, 2<sup>nd</sup> Edition, 2012.
3. Caremon Delessio ET AL,”Android Application Development”,4<sup>th</sup> Edition, Pearson India,2016.

### **OER:**

1. <https://developer.android.com/codelabs/basic-android-kotlin-compose-first-app#1>
2. [www.vogella.com/articles/Android/article.html](http://www.vogella.com/articles/Android/article.html)
3. <https://hackernoon.com/applicationlifecycleinios12b6ba6af78b>
4. <https://www.tutlane.com/tutorial/ios/ioslifecyclearchitecture>
5. <https://developer.android.com/guide/components/activities/activitylifecycle>

## SEMESTER V

### UECAA20 – ELECTIVE I A: RESOURCE MANAGEMENT TECHNIQUES

Year: III	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: V	UECAA20	Resource Management Techniques	Theory	Core Elective	5	5	40+60

#### COURSE OBJECTIVES

1. It will enable the students to learn various research techniques and to find out the solution for the critical problems.
2. To acquiring, allocating and managing the resources.
3. To ensure that internal and external resources are used effectively on time and to budget.
4. To process preplanning, scheduling and allocating the resources to maximize efficiency.
5. To aim smoothing problems using PERT and CPM model.

#### COURSE OUTCOMES

The Learners will be able to

1. Identify the role of computer in Operational Research techniques.
2. Apply linear programming to solve real-life applications.
3. Analyze Transportation Model and Solve optimization problems using dual simplex method.
4. Describe Assignment Model and Travelling Salesman Problem, Sequencing problem
5. Use PERT and CPM for problems in project management

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	H	L	H
CO2	L	M	M	L	M	M
CO3	H	M	L	H	M	L
CO4	M	M	L	M	L	L
CO5	L	L	M	M	M	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	L	H	M	H
CO2	M	H	H	L	H	M
CO3	H	M	L	M	H	M
CO4	H	L	H	M	H	H
CO5	L	M	H	H	L	H

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I: Introduction and Mathematical Formulation

Hours: 15

- 1.1 Operations research: Definition (K1, K2, K3, K4)
- 1.2 Scope, Characteristics (K1, K2, K3, K4)
- 1.3 Models of operations research: Iconic (K1, K2, K3, K4)
- 1.4 Analogue, Symbolic model (K1, K2, K3, K4)
- 1.5 Linear programming (K1, K2, K3, K4)
- 1.6 Formulation. (K1, K2, K3, K4)

### Unit II: Linear Programming

Hours: 15

- 2.1 Linear Programming: Graphical method (problems: part I) (K1, K2, K3, K4)
- 2.2 Graphical method (problems: part II) (K1, K2, K3, K4)
- 2.3 Graphical method (problems: part III) (K1, K2, K3, K4)
- 2.4 Regular simplex Method (problems: part I) (K1, K2, K3, K4)
- 2.5 Regular simplex Method (problems: part II) (K1, K2, K3, K4)
- 2.6 Regular simplex Method (problems: part III) (K1, K2, K3, K4)

### Unit III: Linear Programming

Hours: 15

- 3.1 Linear programming: Big 'M' method (problems part I) (K1, K2, K3, K4)
- 3.2 Big 'M' method (problems part II) (K1, K2, K3, K4)
- 3.3 Big 'M' method (problems part III) (K1, K2, K3, K4)
- 3.4 Duality (problems part I) (K1, K2, K3, K4)
- 3.5 Duality (problems part II) (K1, K2, K3, K4)
- 3.6 Duality (problems part III) (K1, K2, K3, K4)

**Unit IV: Transportation Model****Hours: 15**

- 4.1 Transportation Problem (K1, K2, K3, K4)
- 4.2 Initial basic feasible solution using North West Corner rule(K1, K2, K3, K4)
- 4.3 Initial basic feasible solution using least cost method and Vogel's approximation method (K1, K2, K3, K4)
- 4.4 Degeneracy, Unbalanced Transportation problem (K1, K2, K3, K4)
- 4.5 Maximization problem(K1, K2, K3, K4)
- 4.6 Test of Optimality using MODI method (K1, K2, K3, K4)

**Unit V: Assignment Model****Hours: 15**

- 5.1 Assignment problems (K1, K2, K3, K4)
- 5.2 Minimal assignment problems (K1, K2, K3, K4)
- 5.3 Unbalanced Assignment problems (K1, K2, K3, K4)
- 5.4 Restricted Assignment problems (K1, K2, K3, K4)
- 5.5 Maximization problem in Assignment (K1, K2, K3, K4)
- 5.6 Maximization problems in Assignment Problems (K1, K2, K3, K4)

**Book for Study:**

1. Prem Kumar Gupta and D.S. Hira, "Operations Research", Sixth Edition, S. Chand, 2014.
2. Vittal P. R - Introduction to Operations Research, 1<sup>st</sup> Edition - Margham Publishers – 1999.

**Books for Reference:**

1. Prof. V. Sundharesan, "Resource Management Techniques", 7<sup>th</sup> Edition, AR Publications, 2015.
2. Hamdy A. Taha, "Operation Research - An Introduction", 9<sup>th</sup> Edition, Pearson, 2014.
3. Charnes A. Cooper W. and A. Henderson A., "Introduction to Linear Programming", John Wiley and Sons, 1953.
4. Dr.B.Subbulakshmi,G.Josephine Shanthi,"Resource Management Techniques", Charulatha Publications Private Limited,2019.

**OER:**

1. [https://www.brainkart.com/subject/Resource-Management-Techniques\\_176/](https://www.brainkart.com/subject/Resource-Management-Techniques_176/)
2. [https://books.google.co.in/books?id=OtUxEAAAQBAJ&printsec=copyright&redir\\_esc=y#v=onepage&q&f=false](https://books.google.co.in/books?id=OtUxEAAAQBAJ&printsec=copyright&redir_esc=y#v=onepage&q&f=false)

## SEMESTER V

### UECAB20 - ELECTIVE I B: CLOUD COMPUTING

Year: III	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: V	UECAB20	Elective I B: Cloud Computing	Theory	Elective	5	5	40+60

#### COURSE OBJECTIVES

1. Discuss the fundamental concepts in cloud computing technologies.
2. Understand the various technologies.
3. Explain the architecture and concept of different Cloud models: IaaS, PaaS, SaaS
4. Analyze the fundamental and cloud Deployment Models Course Outcomes.
5. Understand the concepts of Challenges in cloud security.

#### COURSE OUTCOMES

The Learners will be able to

1. Understand the fundamental concepts in cloud computing technologies.
2. Analyze and integrate the cloud enabling services.
3. Analyze the architecture and concept of different cloud models: IaaS, PaaS, SaaS.
4. Understand and familiar with the deployment models.
5. Comprehend the cloud Data Security concepts and how they are addressed with the security mechanisms.

CO/PO	PO					
	1	2	3	4	5	6

<b>CO1</b>	M	M	M	H	M	L
<b>CO2</b>	H	L	L	M	L	L
<b>CO3</b>	M	M	L	M	L	L
<b>CO4</b>	M	M	H	L	L	L
<b>CO5</b>	L	M	L	M	M	M

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	H	M	H	L	M
<b>CO2</b>	M	H	H	M	L	M
<b>CO3</b>	H	M	H	M	H	H
<b>CO4</b>	L	H	H	M	H	L
<b>CO5</b>	H	H	M	L	M	H

**Low – L, Medium – M, High - H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours:15**

- 1.1 Introduction to cloud Computing: cloud Computing in Nutt shell (K2, K4)
- 1.2 Roots of cloud Computing- Types of clouds (K4, K6)
- 1.3 Features of a cloud (K5)
- 1.4 cloud Infrastructure Management (K4, K6)
- 1.5 Challenges and Risks (K4, K6)
- 1.6 Migrating in to a cloud. (K4)

### **Unit II**

**Hours: 15**

- 3.1 Integration as a Service-Introduction (K2)
- 3.2 Onset of Knowledge Era- Evolution of SaaS (K4, K5)
- 3.3 Challenges (K4, K5)
- 3.4 Approaching the SaaS Integration- New Integration Scenarios (K4)
- 3.5 Integration Methodologies-SaaS Integration Services (K4, K5)
- 3.6 B2B Services. (K4, K6)

### **Unit III**

**Hours: 15**

- 3.1 cloud Service Models: Infrastructure as a Service (IaaS): Introduction to IaaS, Resource Virtualization (K2, K4)
- 3.2 Server, Storage, Network. (K2, K4)
- 3.3 Case studies (K4, K5)
- 3.4 Platform as a Service (PaaS): Introduction to PaaS (K2, K4)
- 3.5 cloud platform & Management (K2, K3)
- 3.6 Computation, Storage. (K3, K4)

### **Unit IV**

**Hours: 15**

- 4.1 Cloud Deployment Models: Introduction (K2)
- 4.2 Public Deployment Model (K2, K4, K5)
- 4.3 Private Deployment Model (K2, K4, K5)
- 4.4 Virtual Private Deployment Model (K4, K5)
- 4.5 Hybrid Deployment Model (K4, K5)
- 4.6 Community Deployment Model. (K4, K5)

## **Unit V**

**Hours: 15**

- 5.1 Scientific Applications for cloud Environments (K2, K4, K5)
- 5.2 Building Content Delivery Networks Using clouds (K2, K3, K4)
- 5.3 Cloud Challenges: Organizational Readiness and Change management in Cloud (K2, K4)
- 5.4 Data Security in the cloud (K4, K5)
- 5.5 Legal Issues in cloud Computing (K4)
- 5.6 Production Readiness for cloud Services. (K4, K5)

### **Book for Study:**

1. Rajkumar Buyya, James Broberg and Andrzej M.goscinski, “Cloud Computing: Principles and Paradigms”, John Wiley & Sons,2010.

### **Books for Reference:**

1. Antony T. Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw- Hill Pub, 2010.
2. Haley beard, “Cloud Computing best practices for managing and measuring processes for on-demand computing, applications and Data centers in the Cloud with SLAs”, Emereo Pvt. Limited,2009.
3. Shailendra Singh,”Cloud Computing”1<sup>st</sup> Edition, Oxford University Press,2018.

### **OER:**

1. <http://www.mb.net/resources/COud-computing-resources.aspx>.
2. [https://www.tutorialspoint.com/COud\\_computing/COud\\_computing\\_tutorial.pdf](https://www.tutorialspoint.com/COud_computing/COud_computing_tutorial.pdf)



## SEMESTER V

### UECAC20 - ELECTIVE I C: OBJECT ORIENTED ANALYSIS AND DESIGN

Year: III	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: V	UECAC20	Elective I C: Object Oriented Analysis and Design	Theory	Core	5	5	40+60

#### COURSE OBJECTIVES

1. Understand the importance and basic concepts and of object oriented modeling.
2. To understand the Object-based view of Systems
3. To develop robust object-based models for Systems
4. Specify, analyze and design the use case driven requirements for a particular system.
5. Identify, analyze the subsystems, various components and collaborate them interchangeably Model the event driven state of object and transform them into implementation specific layouts.

#### COURSE OUTCOMES

The Learners will be able to

1. Analyse, design, document the requirements through use case driven approach.
2. Identify, analyse, and model structural and behavioural concepts of the system.
3. Develop exPSOre the conceptual model into various scenarios and applications.
4. Apply the concepts of architectural design for dePSOying the code for software.

5. Apply the Testing Strategies and Debugging Principles for measuring the User Satisfaction

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	M	H
CO2	L	H	M	M	L	M
CO3	H	M	M	L	M	L
CO4	M	H	M	L	H	L
CO5	M	L	L	H	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	H	H	L	M
CO2	H	H	M	L	H	H
CO3	M	L	M	H	H	M
CO4	M	H	H	M	H	L
CO5	L	M	H	M	H	H

Low - L, Medium - M, High – H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 System Development (K1, K2)
- 1.2 Object Basics (K1, K2)
- 1.3 Development Life Cycle (K1, K2, K3)
- 1.4 Methodologies - Patterns (K1, K2, K3, K4)
- 1.5 Frameworks (K1, K2, K3, K4)
- 1.6 Unified Approach - UML. (K1, K2, K3, K4)

### Unit II

Hours: 15

- 2.1 Use-Case Models (K1, K2, K3)
- 2.2 Object Analysis (K1, K2, K3, K4)
- 2.3 Object relations (K1, K2, K3, K4)
- 2.4 Attributes - Methods (K1, K2, K3)
- 2.5 Class and Object responsibilities (K1, K2)
- 2.6 Case Studies (K1, K2, K3, K4)

### Unit III

Hours: 15

- 3.1 Design Processes (K1, K2, K3)
- 3.2 Design Axioms (K1, K2)
- 3.3 Class Design (K1, K2, K3)
- 3.4 Object Storage (K1, K2)
- 3.5 Object Interoperability (K1, K2, K3)
- 3.6 Case Studies. (K1, K2, K3, K4)

**Unit IV****Hours: 15**

- 4.1 User Interface Design (K1, K2, K3)
- 4.2 View layer Classes (K1, K2, K3)
- 4.3 Micro-Level Processes (K1, K2, K3)
- 4.4 Micro-Level Processes (K1, K2, K3)
- 4.5 View Layer Interface (K1, K2)
- 4.6 Case Studies (K1, K2, K3, K4)

**Unit V****Hours: 15**

- 5.1 Quality Assurance Tests (K1, K2)
- 5.2 Testing Strategies - Object orientation on testing (K1, K2, K3, K4)
- 5.3 Test Cases – Test Plans - Continuous testing (K1, K2, K3, K4)
- 5.4 Debugging Principles (K1, K2)
- 5.5 System Usability - Measuring User Satisfaction (K1, K2, K3, K4)
- 5.6 Case Studies (K1, K2, K3, K4)

**Book for Study:**

1. Ali Bahrami, Reprint 2009, Object Oriented Systems Development, Tata McGraw Hill International Edition.

**Book for Reference:**

1. Roger S.Pressman, 2010, Software Engineering A Practitioner's approach, Seventh Edition, Tata McGraw Hill, New Delhi.
2. Rumbaugh, Blaha, Premerlani, Eddy, Lorensen, 2003, Object Oriented Modeling and design, Pearson education, Delhi.
3. Dr.Ikvinderpal Singh,ER.Sangeeta Bhandari,"Object Oriented Modeling,Analysis and Design",1<sup>st</sup> Edition, Khanna Book Publishing Company,2014.

**OER:**

1. [https://www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/ooad\\_object\\_oriented\\_system.htm](https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_system.htm)
2. [https://warin.ca/ressources/books/2015\\_Book\\_Object-OrientedAnalysisDesignA.pdf](https://warin.ca/ressources/books/2015_Book_Object-OrientedAnalysisDesignA.pdf)
3. <https://zjnu2017.github.io/OOAD/reading/Object.Oriented.Analysis.and.Design.with.Applications.3rd.Edition.by.Booch.pdf>

**SEMESTER V**  
**UCCAO23 - PRACTICAL - VII: RDBMS**

<b>Year: III Sem: V</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCAO23	Practical - VII: RDBMS	Practical	Core	3	2	40+60

**COURSE OBJECTIVES**

1. The objective of this course is to expose the students to the fundamentals & basic concepts in relational Data Base Management Systems.
2. To identify the basic concepts and various data model used in database design
3. To analyze various aggregate functions using SQL commands.
4. To use an SQL interface of a relational DBMS package to create, populate, maintain, and query a database.
5. To apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression from queries.

**COURSE LEARNING OUTCOMES**

The Learners will be able to

1. Attain a good practical understanding of the Oracle.
2. Design and implement a database schema for a given problem-domain.
3. Construct a query using SQL DDL, DML, and DCL Commands.
4. Prepare various database tables and joins them using SQL commands. Analyze various aggregate functions using SQL commands
5. Design and develop front end tool VB .NET to design forms, and select, insert, delete, update using Data Source Binding.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	M	M	M
CO2	L	H	M	M	M	L
CO3	L	L	M	L	M	M
CO4	M	H	M	M	H	L
CO5	M	L	M	H	M	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	H	M	M	H	L
CO2	M	M	H	H	M	M
CO3	H	L	H	L	H	H
CO4	M	H	H	H	L	M
CO5	M	H	L	H	H	L

**Low -L, Medium -M, High-H**

### Practical Program

**Hours: 40**

1. Creating data base tables and using data types. Create table Modify table Drop table
2. Practical Based on Data Manipulation Adding data with Insert Modify data with Update Deleting records with Delete
3. Practical Based on Implementing the Constraints NULL and NOT NULL Primary Key and Foreign Key Constraint Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses Simple select clause Accessing specific data with Where Ordered By Distinct and Group By
5. Practical Based on Aggregate Functions AVG -COUNT - MAX -MIN -SUM – CUBE
6. Practical Based on implementing all String functions and Date and Time Functions, union, intersection, set difference.
7. Implement Nested Queries & JOIN operation.
8. Practical Based on implementing use of triggers, cursors & procedures.
9. Make Database connectivity with front end tool VB and Oracle as back end perform Insertion, Deletion and Updation for the following:
  - Staff Information System
  - Electricity Bill Processing System

## SEMESTER V

### UCCAP23 - PRACTICAL VI: MOBILE APPLICATION DEVELOPMENT

Year: III Sem: V	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
	UCCAP23	Practical VI: Mobile Application Development	Practical	Core	2	2	40+60

#### COURSE OBJECTIVES

1. To introduce students to the concept of basic programming- thereby reducing the design complexity and reusability of a component.
2. To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
3. To understand how to work with various mobile application development frameworks.
4. To learn the basic and important design concepts and issues of development of mobile applications.
5. To understand the capabilities and limitations of mobile devices.

#### COURSE OUTCOMES

The Learners will be able to

1. Establishing the development environment
2. Implementing the layout to add action bar
3. Understanding the interfaces using views , menus and notification
4. Apply and learn multiple screens to emulate android application
5. Perform basic interaction with application and change Android styles and themes.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	M	L	H	H	L
CO2	M	H	L	M	M	M
CO3	L	M	M	H	M	M
CO4	M	L	M	M	H	L
CO5	M	L	M	H	H	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	H	L	L	M	H
CO2	H	M	H	H	M	L
CO3	H	M	H	H	L	M
CO4	M	L	H	L	H	H
CO5	H	H	M	L	H	H

**Low -L, Medium -M, High-H**

**Practical Program:**

**Hours: 40**

1. Creating a simple “Hello World” application
2. Adding an action bar to android app to make application interactive
3. Build user interfaces using Views, Menus and Notifications
4. Handle file operations in Android application program.
5. Build an android application with multiple screens.
6. Learning Android Emulator to emulate android apps on various devices.
7. Use of Intents to perform basic interaction with apps.
8. Using Android styles and themes to make application.

**SEMESTER VI**  
**UCCAQ23 - INTERNET AND WEB PROGRAMMING**

<b>Year: III Sem: VI</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCAQ23	Internet and Web Programming	Theory	Core	5	3	40+60

**COURSE OBJECTIVES**

1. Enhance the programming experience with the help of tools like editors and debuggers that makes JavaScript coding easier and more interactive.
2. Understand the concepts commonly used in dynamic language programming such as higher-order functions and closures.
3. Understand the server-side programming works on the web.
4. Develop dynamic and interactive web pages using the powerful tool and server scripting language like PHP.
5. Understanding File handling concepts to connect, access, and update a MySQL database.

**COURSE OUTCOMES (COs)**

The Learners will be able to

1. Acquire the basic concept of JavaScript.
2. Use operators, variables, arrays, control structures, functions and objects in JavaScript.
3. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
4. Design a responsive web site using HTML, PHP, MySQL and Apache.



5. Students will be able to build dynamic web pages using JavaScript (Client Side Programming) and apply their knowledge to create interactive websites.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	H	M	M	L
CO2	L	M	M	L	M	L
CO3	M	M	M	M	L	H
CO4	L	M	M	H	M	L
CO5	M	M	M	L	H	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	M	M	M	H
CO2	L	H	L	H	M	L
CO3	M	H	M	L	L	M
CO4	H	L	H	L	L	M
CO5	M	H	L	H	M	M

Low - L, Medium - M, High - H

## COURSE SYLLABUS

### Unit I: Java Script

Hours: 15

- 1.1 Introduction - Values - Numbers - Strings - Unary Operators. (K1, K2)
- 1.2 Boolean Values - Empty Values - Automatic Type Conversion. (K2)
- 1.3 Program Structure: Expressions and Statements- Bindings - Binding Names - The Environment. (K2, K3)
- 1.4 Functions - The Console Log Function - Return Values - Control Flow - Conditional Execution - While and Do Loops. (K2, K3)
- 1.5 Indenting Code - For Loops - Breaking out of a Loop - Updating Bindings Succinctly. (K2, K3)
- 1.6 Dispatching on a Value with Switch – Capitalization – Comments. (K3)

### Unit II

Hours: 15

- 2.1 Functions - Bindings and Scopes - Functions as Values. (K2)
- 2.2 Declaration Notation - Arrow Functions - The Call Stack. (K2, K3, K4)
- 2.3 Optional Arguments - Closure – Recursion - Growing Functions. (K3, K4)
- 2.4 Data Structures: Objects and Arrays: The Were Squirrel - Data Sets – Properties – Methods – Objects. (K3, K4)
- 2.5 Mutability - The Lycanthrope’s Log - Computing Correlation - Array Loops - The Final Analysis - Further Arrayology - Strings and their Properties. (K2, K3, K4, K5)
- 2.6 Rest Parameters - The Math Object - Destructuring – JSON. (K2, K3, K4)

### Unit III: PHP Programming

Hours: 15

- 3.1 Web Server – Apache - PHP Introduction - PHP Install - PHP Syntax - PHP Variables. (K1, K2)

- 3.2 PHP Echo / Print - PHP Data Types - PHP Strings - PHP Constants - PHP Operators. (K1, K2)
- 3.3 Control Structures - PHP Functions - Directory Functions - File System Functions. (K2, K3)
- 3.4 PHP Arrays - PHP Sorting – Arrays - PHP - Super Global. (K3, K4)
- 3.5 String Functions - Date and Time Functions. (K1,K2, K3, K4)
- 3.6 Mathematical Functions - Miscellaneous Functions. (K3, K4)

#### **Unit IV**

**Hours: 15**

- 4.1 Basic Form Processing (GET And POST Method) - PHP Form Handling. (K1, K2)
- 4.2 PHP Form Validation - PHP Form Required– URL - E-Mail. (K1, K2)
- 4.3 PHP Form Complete PHP MYSQL Functions -Connect- Create DB. (K4, K6)
- 4.4 Create Table- Insert Data - Get Last ID - Insert Multiple. (K3, K4, K5)
- 4.5 Prepared-Select Data - Delete Data - Update Data - Limit Data. (K3, K4, K5)
- 4.6 Table Join - Database Driven Application. (K3, K4)

#### **Unit V**

**Hours: 15**

- 5.1 PHP Arrays Multi-PHP Date and Time - PHP Include. (K2, K3)
- 5.2 PHP File Handling- PHP File Open/Read. (K3)
- 5.3 PHP File Create/Write - PHP File Upload-PHP Cookies. (K4, K5)
- 5.4 PHP Sessions-PHP Filters - PHP Filters Advanced. (K4)
- 5.5 PHP Error Handling - PHP Exception. (K4, K5)
- 5.6 COM-DOM-CURL-SOAP. (K5, K6)

#### **Books for Study:**

1. MarijiHaverbeke, “Eloquent Javascript, A Modern Introduction to Programming”, Third Edition, Published by No Starch Press, 2018.
2. Julie C Meloni, Sams “Teach yourself PHP, MySQL and Apache”, 6<sup>th</sup> edition, Sams Publishing, 2012.

#### **Books for Reference:**

1. Phil Ballard , JavaScript in 24 Hours, 6th Edition, Sams Teach Yourself, 2015.
2. Ed LeckyThompson Steven D. Nowicki Thomas Myer, “Professional PHP6”, Wrox Press, Paperback Edition, 2011.

#### **OER:**

1. [https://www.google.com/url?sa=t&source=web&rct=j&url=https://eloquentjavascript.net/Eloquent\\_JavaScript.pdf&ved=2ahUKEwjEhbu95qnrAhVo8XMBHb4VBXEQFjAQegQIDBAB&usg=AOvVaw1\\_3Ap2aatDU0qxPmbiCRbI&cshid=1598184133112](https://www.google.com/url?sa=t&source=web&rct=j&url=https://eloquentjavascript.net/Eloquent_JavaScript.pdf&ved=2ahUKEwjEhbu95qnrAhVo8XMBHb4VBXEQFjAQegQIDBAB&usg=AOvVaw1_3Ap2aatDU0qxPmbiCRbI&cshid=1598184133112)

**SEMESTER VI**  
**UCCAR23 - DATA MINING**

<b>Year: III Sem: VI</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCAR23	Data Mining	Theory	Core	4	5	40+60

**COURSE OBJECTIVES**

1. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.
2. To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
3. To develop research interest towards advances in data mining
4. To impart the knowledge of how Data Mining could be used to solve scientific and social problems.
5. To expose to various Data Mining techniques

**COURSE OUTCOMES (Cos)**

The Learners will be able to

1. Understand Data Warehouse fundamentals and Data Mining Principles
2. Understand and implement classical algorithms in data mining and identify the application area of algorithms.

3. Compare and evaluate different data mining techniques like, prediction, clustering and association rule mining
4. Describe complex data types with respect to spatial and web mining.
5. Analyze the temporal mining techniques to detect patterns in the e-world.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	L	H	L	M
CO2	H	M	M	L	L	H
CO3	M	L	M	M	L	M
CO4	L	M	L	M	M	L
CO5	H	L	L	M	H	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	M	L	M	H
CO2	L	M	L	M	M	L
CO3	M	H	M	L	L	M
CO4	L	L	H	M	L	M
CO5	H	L	L	H	M	L

**Low – L, Medium – M, High - H**

## COURSE SYLLABUS

### Unit I

**Hours: 14**

- 1.1 Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery In Databases (K1, K2)
- 1.2 Data Mining Issues – Social Implications of Data Mining (K2)
- 1.3 Data Mining from A Database Perspective. Data Mining Techniques: Introduction – A Statistical Perspective on Data Mining (K2, K3)
- 1.4 Similarity Measures (K1, K2, K3)
- 1.5 Decision Trees (K2, K3)
- 1.6 Neural Networks – Genetic Algorithms. (K1, K2, K3)

### Unit II

**Hours: 13**

- 2.1 Classification: Introduction (K1, K2, K3)
- 2.2 Statistical – Based Algorithms (K2, K3, K5)
- 2.3 Distance- Based Algorithms (K2, K3, K5)
- 2.4 Decision Tree- Based Algorithms (K2, K3, K5)
- 2.5 Neural Network – Based Algorithms (K2, K3, K5)
- 2.6 Rule-Based Algorithms (K2, K3, K5)

### Unit III

**Hours: 15**

- 3.1 Clustering: Introduction – Similarity and Distance Measures – Outliers (K2, K3, K5)
- 3.2 Hierarchical Algorithms – Partitional Algorithms (K3, K4, K5)
- 3.3 Association Rules: Introduction - Large Item Sets – Basic Algorithms (K2, K3, K5)

- 3.4 Parallel and Distributed Algorithms (K2, K3, K5)
- 3.5 Comparing Approaches – Incremental Rules (K3, K5, K6)
- 3.6 Advanced Association Rules Techniques – Measuring the quality of Rules (K3, K5)

**Unit IV**

**Hours: 15**

- 4.1 Web mining: Introduction – Web content Mining Crawlers (K2, K3)
- 4.2 Web Structure Mining (K2, K3)
- 4.3 Web Usage Mining (K2, K3)
- 4.4 Spatial Mining: Overview – Primitives (K2, K3, K5)
- 4.5 Generalization and specialization (K2, K3, K5)
- 4.6 Spatial Rules- Spatial Classification Algorithm. (K2, K3, K5)

**Unit V**

**Hours: 12**

- 5.1 Temporal Mining: Introduction (K2)
- 5.2 Modeling temporal events (K2, K3)
- 5.3 Time series (K2, K3, K5)
- 5.4 Pattern detection (K2, K3, K4, K5, K6)
- 5.5 Sequences (K2, K3, K5, K6)
- 5.6 Temporal Associations Rules (K2, K3, K5)

**Books for Study:**

1. Margaret H.Dunham - “Data Mining: Introductory and Advanced Topics”, 1<sup>st</sup> Edition, Pearson Education 2012.
2. Jiawei Han and MichelineKamber - “Data Mining Concepts and Techniques” - Elsevier Fifth Edition, 2009.

**Books for Reference:**

1. Soumendra Mohanty - “Data Warehousing DesignDevelopment and best practices”, First Edition, TataMcGraw Hill, 2005.
2. William H Inmon - “Building the Datas warehousing”, Fourth Edition, Wiley India.
3. RajanChattamvelli“Data Mining Methods”, Second Edition, Narosa Publishing House Pvt. Ltd. New Delhi, 2016

**OER:**

1. <https://www.slideshare.net/akannshat/data-mining-15329899>
2. <http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
3. [https://www.youtube.com/watch?v=f7NfO16l04U&list=PL8eNk\\_zTBST-gN6Y5E-5FZdARXjglYpyT](https://www.youtube.com/watch?v=f7NfO16l04U&list=PL8eNk_zTBST-gN6Y5E-5FZdARXjglYpyT)

**SEMESTER VI**  
**UECAD20 - ELECTIVE – II A: CRYPTOGRAPHY**

<b>Year:</b> <b>III</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b> 40 + 60
<b>Sem:</b> <b>VI</b>	UECAD20	Elective – II A: Cryptography	Theory	Elective	5	5	

**COURSE OBJECTIVES**

1. To understand Cryptography Theories, Algorithms and Systems.
2. To understand necessary Approaches and Techniques
3. To build protection mechanisms in order to secure computer networks.
4. Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.
5. Understand vulnerability assessments and the weakness of using passwords for authentication.

**COURSE OUTCOMES (Cos)**

The Learners will be able to

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Basic concepts of system level security

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	L	M	M	L	L
CO2	M	M	L	H	L	L
CO3	H	L	M	L	M	M
CO4	L	M	L	M	L	M
CO5	H	L	M	M	L	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	L	M	H
CO2	L	H	L	H	M	L
CO3	M	L	M	L	H	M
CO4	H	L	M	M	L	M
CO5	H	L	L	H	M	L

Low – L, Medium – M, High - H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 Computer Security Concepts (K2)
- 1.2 The OSI Security Architecture (K2 K4)
- 1.3 Security Attacks - Security Services Security Mechanisms - A model for Network Security(K2)
- 1.4 Symmetric Cipher Model (K2, K4)
- 1.5 Substitution Techniques (K2, K5)
- 1.6 Transposition Techniques - Stenography.(K2, K5)

### Unit II

Hours: 16

- 1.1 Block Cipher Principles (K2, K3)
- 1.2 The DES - A DES example - The strength of DES(K2, K4)
- 1.3 Differential and Linear Cryptanalysis (K2)
- 1.4 Block Cipher Design Principles (K2, K4)
- 1.5 Divisibility and Division algorithms (K2, K4)
- 1.6 The Euclidean Algorithm - Modular Arithmetic.(K2, K4)

### Unit III

Hours: 15

- 3.1 Origin of AES - AES Structure (K2)
- 3.2 AES round function (K2, K4)
- 3.3 AES Key Expansion (K2)
- 3.4 AES Implementation. (K2, K3)
- 3.5 Multiple Encryption (K2, K3)
- 3.6 Triple DES (K2, K3)

### Unit IV

Hours: 14

- 4.1 Prime Numbers (K2, K3)
- 4.2 Fermat's and Euler's Theorem (K2, K3)
- 4.3 Testing for Primality (K2, K3)
- 4.4 The Chinese Remainder Theorem (K2, K4)
- 4.5 Principles of Public Key Cryptosystems(K2, K4)
- 4.6 The RSA Algorithm.K2, K3, K4)

**Unit V****Hours: 12**

- 5.1 Diffie - Helman Key Exchange (K2, K3)
- 5.2 Digital Signatures (K2)
- 5.3 Symmetric Key Distribution Using Symmetric Encryption (K2, K4)
- 5.4 Symmetric Key Distribution Using Asymmetric Encryption (K2, K4)
- 5.5 Distribution of Public Keys (K2)
- 5.6 Kerberos.(K2)

**Book for Study:**

1. William Stallings, “Cryptography and Network Security Principles and Practices”, Seventh Edition, Prentice Hall, 2020.

**Book for Reference:**

1. Behrouz A. Forouzan, “Cryptography and Network Security”, 2<sup>nd</sup> Edition, Tata McGraw Hill 2010
2. C K Shyamala, N Harini and Dr. T R Padmanabhan: “Cryptography and Network Security”, First Edition, Wiley India Pvt.Ltd, 2015.

**OER:**

1. <https://faculty.nps.edu/dedennin/publications/Denning-CryptographyDataSecurity.pdf>
2. <https://www.youtube.com/watch?v=9X1rSWLFhLY&list=PL9FuOtXibFjV77w2eyil4Xzp8eooqsPp8>

**SEMESTER VI****UECAE20 - ELECTIVE II B: COMPUTER GRAPHICS**

<b>Year:</b>	<b>Course Code</b>	<b>Title of The Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
<b>III Sem: VI</b>	UECAE20	Elective II B: Computer Graphics	Theory	Elective	5	5	40+60

**COURSE OBJECTIVES**

1. Understand two dimensional graphics and their transformations.
2. Gain knowledge about graphics hardware devices and software used.
3. Understand three dimensional graphics and their transformations and to become familiar with clipping techniques.
4. To understand the importance of visual representation.
5. To design 2D and 3D techniques for graphics.

**COURSE OUTCOMES (Cos)**

The Learners will be able to

1. Understand the basic objectives and scope of computer graphics
2. To acquire knowledge on graphics hardware devices and software used.
3. Implement various algorithms to scan, convert the basic geometrical primitives, Transformations, Area filling, clipping.
4. Understand the concepts of and techniques used in 2D and 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture



5. Understand the concepts of computer graphics, including viewing, projection, Perspective, modeling and transformation in two and three dimensions.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	M	M	M
CO2	H	L	M	M	M	L
CO3	M	M	L	L	M	H
CO4	M	L	M	M	L	L
CO5	H	M	L	H	M	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	H	M	H
CO2	L	H	L	H	M	L
CO3	M	M	M	L	H	M
CO4	H	L	L	M	L	M
CO5	H	M	L	H	M	M

Low -L, Medium -M, High-H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 Overview of graphics Systems: Video Display Device (K1, K2, K3)
- 1.2 Raster Scan Displays and Random Scan Displays (K1, K2, K3)
- 1.3 Graphics Monitor and Workstation (K1, K2)
- 1.4 Input Devices (K1, K2)
- 1.5 Hard Copy Devices (K1, K2)
- 1.6 Graphics software (K1, K2)

### Unit II

Hours: 15

- 2.1 Output Primitives: Points and Lines (K1, K2, K3)
- 2.2 Line Drawing Algorithms: DDA Algorithms and Bresenham's Line Algorithm (K1, K2, K3, K4)
- 2.3 Circle generating Algorithm (K1, K2, K3, K4)
- 2.4 Attributes of Output Primitives: Line Attributes (K1, K2, K3)
- 2.5 Area-Fill Attributes (K1, K2, K3)
- 2.6 Character Attributes (K1, K2, K3)

### Unit III

Hours: 15

- 3.1 Two Dimensional Geometric Transformation: Basic Transformations (K1, K2, K3)
- 3.2 Matrix Representations and Homogeneous Coordinates (K1, K2, K3)
- 3.3 Composite Transformations (K1, K2, K3)
- 3.4 Other Transformations Reflections (K1, K2, K3)
- 3.5 Two Dimensional Viewing: Viewing Pipeline (K1, K2, K3)
- 3.6 Window to Viewport Coordinate Transformation (K1, K2, K3)

### Unit IV

Hours: 15

- 4.1 Clipping Operations - Point Clipping (K1, K2, K3)
- 4.2 Line Clipping: Cohen-Sutherland Line Drawing Algorithm (K1, K2, K3)
- 4.3 Polygon Clipping: Sutherland Hodgeman Polygon Clipping (K1, K2, K3)
- 4.4 Curve Clipping - Text Clipping - Exterior Clipping (K1, K2, K3)
- 4.5 Input of Graphical Data Logical Classification of Input Devices (K1, K2, K3)
- 4.6 Interactive Picture Construction Techniques (K1, K2, K3)

## **Unit V**

**Hours: 15**

- 5.1 Three Dimensional Concepts: Three Dimensional Display methods - Parallel projection (K1, K2, K3)
- 5.2 Perspective Projection (K1, K2, K3)
- 5.3 Depth Cueing - Visible Line and Surface Identification (K1, K2, K3)
- 5.4 Three Dimensional Geometric and modeling Transformations: Translation – Rotation and Scaling (K1, K2, K3)
- 5.5 Other Transformations (K1, K2, K3)
- 5.6 Three Dimensional Viewing: Projections (K1, K2, K3)

### **Books for Study:**

1. Donald Hearn, M. Pauline Baker, “Computer Graphics”, 2<sup>nd</sup> Edition, Prentice Hall of India Publication, 2011.
2. Donald Hearn, M. Pauline Baker Warren Carithers, “Computer Graphics with Open GL”, 4<sup>th</sup> Edition, Pearson Publication, 2014.

### **Books for Reference:**

1. Apurva A. Desai - “Computer Graphics”, 1<sup>st</sup> Edition, Prentice Hall of India Publication, 2008.
2. ISRD Group - “Computer Graphics”, Second Edition, McGraw Hill Book Company, 2008.

### **OER:**

1. <http://freecomputerbooks.com/specialcompsecGraphBooks.html>
2. [https://drive.uqu.edu.sa/\\_/fbshareef/files/Computer%20Graphics%20C%20Version%20by%20Donald%20Hearn%20&%20M%20Pauline%20Baker%20II%20Edition.pdf](https://drive.uqu.edu.sa/_/fbshareef/files/Computer%20Graphics%20C%20Version%20by%20Donald%20Hearn%20&%20M%20Pauline%20Baker%20II%20Edition.pdf)

## SEMESTER VI

### UECAF20- ELECTIVE - III A: MOBILE COMPUTING

Year: III Sem: VI	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
	UECAF20	Elective - III A: Mobile Computing	Theory	Elective	5	5	40+60

#### COURSE OBJECTIVES

1. To understand the basic concepts of mobile computing.
2. To be familiar with the network layer protocols and AdHoc networks.
3. To know the basis of transport and application layer protocols.
4. To gain knowledge about different mobile platforms and application development.
5. Understand fundamentals of wireless communications. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.

#### COURSE OUTCOMES (Cos)

The Learners will be able to

1. Understand the basic concepts of mobile computing.
2. Expand the network layer protocols and AdHoc networks.
3. Apply the basis of transport and application layer protocols.
4. Develop knowledge about different mobile platforms and application development.
5. Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	L	M	M	L	M
CO2	L	M	L	M	H	H
CO3	L	M	M	L	M	M
CO4	M	H	M	L	M	H
CO5	H	M	M	H	L	M

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	L	H	M	H
CO2	L	H	L	L	M	L
CO3	M	H	M	L	H	M
CO4	M	L	H	M	L	M
CO5	H	L	L	H	M	L

Low - L, Medium - M, High – H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 Introduction to Mobile Computing (K1)
- 1.2 Applications of Mobile Computing (K2, K3, K4)
- 1.3 Generations of Mobile Communication Technologies (K1, K2, K3)
- 1.4 Multiplexing (K1, K2, K3, K4)
- 1.5 Spread spectrum (K1, K2, K3)
- 1.6 MAC Protocols – SDMA- TDMA- FDMA- CDMA (K1, K2, K3, K4)

### Unit II

Hours: 15

- 2.1 Introduction to Cellular Systems (K1, K2, K3, K4)
- 2.2 GSM – Services & Architecture – Protocols (K1, K2, K3)
- 2.3 Connection Establishment (K1, K2, K3)
- 2.4 Frequency Allocation – Routing (K1, K2, K3)
- 2.5 Mobility Management – Security (K1, K2, K3, K4)
- 2.6 GPRS- UMTS – Architecture – Handover – Security (K1, K2)

### Unit III

Hours: 15

- 3.1 Mobile IP – DHCP – AdHoc (K1, K2, K3)
- 3.2 Proactive protocol-DSDV (K1, K2, K3)
- 3.3 Reactive Routing Protocols – DSR, AODV Hybrid routing –ZRP (K1,K2)
- 3.4 Multicast Routing- ODMRP (K1, K2, K3, K4)
- 3.5 Vehicular Ad Hoc networks ( VANET) (K1, K2, K3, K4)
- 3.6 MANET Vs VANET – Security (K1, K2, K3, K4)

### Unit IV

Hours: 15

- 4.1 Mobile TCP (K1, K2, K3)
- 4.2 WAP – Architecture (K2, K3, K4)
- 4.3 WDP – WTLS (K2,K3)
- 4.4 WTP –WSP (K2,K3)
- 4.5 WAE – WTA Architecture (K2,K3)
- 4.6 WML (K2,K3)

#### **Unit V**

**Hours: 15**

- 5.1 Mobile Device Operating Systems (K1, K2)
- 5.2 Special Constraints & Requirements (K1, K2)
- 5.3 Commercial Mobile Operating Systems (K1, K2, K3)
- 5.4 Software Development Kit: iOS, Android, BlackBerry, Windows Phone (K1, K2, K3)
- 5.5 M-Commerce – Structure – Pros & Cons (K1, K2)
- 5.6 Mobile Payment System – Security Issues (K1, K2)

#### **Book for Study:**

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, Second Edition, PHI Learning Pvt. Ltd, New Delhi, 2012.

#### **Books for Reference:**

1. Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile Systems", Fourth Edition, Thomson Asia Pvt Ltd, 2017.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Second Edition, Springer, 2007.

#### **OER:**

1. <https://www.bookganga.com/eBooks/Books/details/4855549396506651616?BookName=Moble-Computing>.
2. [https://www.tutorialspoint.com/cloud\\_computing/cloud\\_computing\\_tutorial.pdf](https://www.tutorialspoint.com/cloud_computing/cloud_computing_tutorial.pdf)

## SEMESTER VI

### UECAG20 – ELECTIVE – III B: ARTIFICIAL INTELLIGENCE

Year: III	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: VI	UECAG20	Elective III B: Artificial Intelligence	Theory	Elective	5	5	40+60

#### COURSE OBJECTIVES

1. Gain a historical perspective of AI and its foundations.
2. Become familiar with basic principles of AI toward problem solving inference, perception, knowledge representation, and learning.
3. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. To understand the concept of learning techniques.
5. To know about Context Free Grammars.

#### COURSE OUTCOMES (Cos)

The Learners will be able to

1. Understanding different types of AI Agents and its Environments.
2. Know Various AI Search Algorithms (uninformed, informed, heuristic search).
3. Understand the fundamentals of Knowledge representation (logic based, frame based).
4. Understand the different types of Learning.

5. Ability to apply knowledge representation, reasoning , and machine learning Techniques

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	L	M	L	H	M
CO2	L	M	M	H	M	L
CO3	M	M	H	M	L	M
CO4	H	L	M	M	H	M
CO5	M	L	M	L	M	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	M	H	M	H
CO2	L	M	L	M	M	L
CO3	M	H	M	L	H	M
CO4	H	L	H	L	L	M
CO5	H	H	L	M	M	H

Low -L, Medium -M, High-H

## COURSE SYLLABUS

### Unit I

Hours: 15

- 1.1 Artificial Intelligence- Introduction- Foundation of Artificial Intelligence. (K1, K2)
- 1.2 History of Artificial Intelligence- Intelligent Agents- Agents and Environment. (K1, K2, K3)
- 1.3 Good Behavior- The Concept of Rationality- Performance Measures- Rationality. (K1, K2, K3)
- 1.4 Problem Solving- Solving Problem by searching- Problem Solve Agents. (K1, K2, K3, K4)
- 1.5 Well Defined Problems and Solutions- Formulating Problems. (K1, K2, K3, K4)
- 1.6 Uniformed Search Strategies- Breadth First Search- Depth First Search. (K1, K2, K3, K4)

### Unit II

Hours: 15

- 1.7 Informed Search- Greedy Best First Search- A\* Search Minimizing the total estimated Solution Cost. (K1, K2, K3, K4)
- 1.8 Hill Climbing Search- Genetic Algorithm. (K1, K2, K3, K4)
- 1.9 Local Search in Continuous space- Online Search Agents and Unknown environments - Online Search problems- Online Search Agents. (K1, K2, K3, K4)
- 1.10 Online Local Search- Learning in Online Search. (K1, K2, K3, K4)
- 1.11 Constraint Satisfaction Problems- Backtracking Search for CSPs. (K1, K2, K3, K4)
- 1.12 Backtracking and Local Search. (K1, K2, K3, K4)

### Unit III

Hours: 15

- 3.1 Logical Agents- Knowledge Based Agents. (K1, K2, K3)

- 3.2 Logic - Propositional Logic A Very simple logic. (K1, K2, K3)
- 3.3 Reasoning Pattern in Propositional Logic- Resolution Forward and Backward Chaining. (K1, K2, K3)
- 3.4 Syntax and Semantics of First order Logic- Models for First Order Logic. (K1, K2, K3)
- 3.5 Symbol and Interpretations- Terms. (K1, K2)
- 3.6 First Order Logic- Assertions and queries in First order Logic. (K1, K2, K3)

#### **Unit IV**

**Hours: 15**

- a. Learning from Observations- Forms of Learning. (K1, K2)
- b. Inductive Learning- Knowledge in Learning- A logical Formulation of Learning. (K1, K2)
- c. Examples and hypotheses- Current best hypothesis search. (K1, K2, K3)
- d. Least Commitment Search- Explanation Based Learning- Extracting General rules from Examples. (K1, K2)
- e. Improving Efficiency- Learning using Relevance Information. (K1, K2)
- f. Inductive Logic Programming- An Example Top down inductive Learning Methods- Inductive learning with inverse deduction. (K1, K2)

#### **Unit V**

**Hours: 15**

- 5.1 Communication –Communication as Action- Fundamentals of Language. (K1, K2)
- 5.2 Formal Grammar for a Fragment of English- Lexicon of  $\epsilon_0$ - Grammar of  $\epsilon_0$ . ((K1, K2, K3)
- 5.3 Syntactic Analysis Parsing- Efficient Parsing. (K1, K2, K3, K4)
- 5.4 Augmented Grammars- Semantic Interpretation. (K1, K2, K3, K4)
- 5.5 The semantics of a English Fragment- Time and Tense- Quantification- Pragmatic Interpretation. (K1, K2, K3, K4)
- 5.6 Languages and generation with DCG’S- Ambiguity and Disambiguation. (K1, K2, K3)

#### **Books for Study:**

1. Stuart Russel Peter Norvig, “Artificial Intelligence- A Modern Approach” Second Edition Pearson Education/ Prentice Hall of India 2010.

#### **Books for Reference:**

1. Nils J.Nilsson,” Artificial Intelligence: A new Synthesis”,First Edition, Harcourt Asia Pvt.Ltd.,1998.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Third Edition, Tata McGraw Hill, 2017.
3. George F.Luger “Artificial Intelligence Structures and Strategies for Complex Problem solving”, Third Edition, Pearson Education/PHI 1997.

#### **OER:**

1. <https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern-approach.9780131038059.25368.pdf&ved=2ahUKEwi9rSJjrHrAhUHxzgGHaiCSgQFjAAegQIAxAB&usq=AOvVaw0Ba2OoXSI4QuGW-AzLXmx1>



## SEMESTER VI

### UCCAS23 -PRACTICAL VII: INTERNET AND WEB PROGRAMMING

Year: III	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
Sem: VI	UCCAY20	Practical VII: Internet and Web Programming	Practical	Core	3	2	40+60

#### COURSE OBJECTIVES

1. Comprehend the usage of PHP and JavaScript in dynamic web development.
2. Understand PHP language data types, logic controls, built-in and user-defined functions.
3. Describe Object oriented programming paradigm in PHP.
4. Understand user validation techniques and cookies.
5. Build a simple, yet functional web application using PHP/MySQL.

#### COURSE OUTCOMES (Cos)

The Learners will be able to

1. Know variable naming rules and JavaScript data types.
2. Use operators, variables, arrays, control structures, functions and objects in JavaScript.
3. Demonstrate objects and arrays usage

4. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
5. Validate user input and create cookies in PHP

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	M	L	M
CO2	L	H	M	M	L	M
CO3	H	L	L	M	M	L
CO4	M	M	M	M	H	L
CO5	M	L	M	L	M	H

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	L	H	L	M	H
CO2	L	H	L	H	M	L
CO3	M	M	M	L	H	M
CO4	H	L	H	M	L	M
CO5	H	M	L	H	M	L

**Low -L, Medium -M, High-H**

**Practical Programs:**

**Hours: 40**

1. Implementing factorial of a number in JavaScript,
2. Animation in JavaScript.
3. Addition and Multiplication of two numbers in JavaScript.
4. Convert the first letter of each word of the sting toUppercase in JavaScript.
5. Implementing Arrays in JavaScript.
6. Implementing Control Statements and Looping in PHP.
7. Implementing Functions in PHP.
8. Implementing Form Processing (GET & POST) in PHP.
9. Implementing Validation in PHP.
10. Implementing Cookies in PHP.

## SEMESTER VI

### UCCAT23 - PROJECT WORK

<b>Year: III Sem: VI</b>	<b>Course Code</b>	<b>Title of the Course</b>	<b>Course Type</b>	<b>Course Category</b>	<b>H/W</b>	<b>Credits</b>	<b>Marks</b>
	UCCAT23	Project Work	Practical	Core	2	3	40+60

The objective of the project is to enable the students to work in a project of latest topic.. Students have to do project throughout the semester in any application to gain practical knowledge of what they have studied in five semesters. Each student shall have a guide from the Department, the students are expected to complete the project and submit a fullfledged report comprising of the complete system developed along with implementation and test results. The submitted report will be evaluated by conducting project viva at the end of the semester. Their progress is monitored continuously to award the internal assessment marks.

**ASSESSMENT:**

**Pattern of Question Paper**

**Theory- Total Marks 100**

Section A (Answer ALL) -  $10 \times 2 = 20$

Section B (either OR) -  $5 \times 7 = 35$

Section C (3 out of 5) -  $3 \times 15 = 45$

**Practical - Total Marks 60**

**Practical:** 45 Marks

**Record:** 10 Marks

**Viva:** 5 Marks

## SEMESTER V

### USCSF520 –SKILL BASED ELECTIVE: R PROGRAMMING

<b>Year: III Sem: V</b>	<b>Course Code</b> USCSG520	<b>Title of the Course</b> Skill Based Elective: R Programming	<b>Course Type</b> Theory with Practical	<b>Course Category</b> Skill	<b>H/W</b> 2	<b>Credits</b> 2	<b>Marks</b> 40+60
-------------------------------------	------------------------------------	---	---	-------------------------------------	-----------------	---------------------	-----------------------

### COURSE OBJECTIVES

Understand the usage of R programming interactive environment.

1. Understand R programming language includes functions, arrays and dataframes.
2. Describe the statistical computing includes programming in R, reading and accessing data in R.
3. Understand the concept of Meta Programming.
4. Build a simple sorting algorithm.

CO/PO	PO					
	1	2	3	4	5	6
CO1	H	M	L	M	H	L
CO2	M	H	L	M	L	M

<b>CO3</b>	M	L	L	M	L	M
<b>CO4</b>	H	M	M	H	M	L
<b>CO5</b>	M	L	M	L	M	M

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	L	L	L	M	H
<b>CO2</b>	L	M	L	L	M	L
<b>CO3</b>	M	H	M	L	H	M
<b>CO4</b>	H	L	H	L	L	M
<b>CO5</b>	H	M	L	L	M	H

**Low -L, Medium -M, High-H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours: 6**

- 1.1 Introduction to R and R Studio. (K1, K2)
- 1.2 Basic Objects: Vector. (K2)
- 1.3 Matrix, Array. (K2, K3)
- 1.4 Lists. (K2)
- 1.5 Data Frames. (K3)
- 1.6 Functions. (K2, K3)

### **Unit II**

**Hours: 6**

- 2.1 Basic Expressions: Assignment Expressions. (K1, K2)
- 2.2 Conditional Expressions. (K3, K4)
- 2.3 Loop Expressions. (K3, K4)
- 2.4 Basic Objects: Object Functions (K2, K3)
- 2.5 Logical Functions. (K2, K3)
- 2.6 Math functions (K2, K3)

### **Unit III**

**Hours: 6**

- 3.1 Numeric Methods Statistical function. (K2, K3)
- 3.2 Family Functions. (K2, K3)
- 3.3 Working with Strings. (K2, K3)
- 3.4 Working with Data. (K2, K3)
- 3.5 Meta programming. (K2)
- 3.6 Object Oriented Programming. (K2, K3, K4)

### **Unit IV**

**Hours: 6**

- 4.1 Write a program that prints 'Hello World' to the screen.
- 4.2 Write a program that asks the user for a number n and prints the sum of the numbers 1 to n.
- 4.3 Write a program that prints a multiplication table for numbers up to 12.
- 4.4 Write a function that returns the largest element in a list.

**Unit V****Hours: 6**

- 5.1 Write a function that computes the running total of a list.
- 5.2 Write a function that tests whether a string is a palindrome.
- 5.3 Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort.
- 5.4 Implement linear search.
- 5.5 Implement binary search.
- 5.6 Implement Matrices Addition, Subtraction and Multiplication

**Books for Study:**

1. Kun Ren, “Learning R. Programming, Packt Publishing” - ebooks Account, October 28, 2016.
2. Dr. Mark Gardener, “Beginning R: The Statistical Programming Language”, Paperback, 2013.

**Books for Reference:**

1. Colin Gillespie, Robin Lovelace, “Efficient R Programming: A Practical Guide to Smarter Programming”, O'Reilly Media, 1<sup>st</sup> Edition (October 25, 2016); eBook (2017-04-10).
2. Daniel Navarro, “Learning Statistics with R”, lulu.com (2015); eBook (University of Adelaide, 2018. Updated Continuously)

**OER:**

1. [https://www.jmc.edu/econtent/ug/3202\\_R%20PROGRAM.pdf](https://www.jmc.edu/econtent/ug/3202_R%20PROGRAM.pdf)
2. [http://www.tutorialspoint.com/r/r\\_tutorial.pdf](http://www.tutorialspoint.com/r/r_tutorial.pdf)
3. [https://cran.r-project.org/doc/contrib/Paradis-rdebuts\\_en.pdf](https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf)

**SEMESTER VI****USCSG620 - SKILL BASED ELECTIVE: DATA ANALYTICS USING DATA VISUALIZATION TOOLS**

Year: III Sem: VI	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
	USCSF620	Data Analytics using Data Visualization	Theory with Practical	Skill	2	2	40+60

**COURSE OBJECTIVES**

1. To understand and extend the current state of the art in data visualization.
- 4 To Understand the different data format and its graphical representation
2. To identify the various data visualizations tools in the market and its features.
3. To provide skills present data effectively through chart, map and dashboard.
4. To develop skills to present data effectively through chart, map and dashboard.

CO/PO	PO					
	1	2	3	4	5	6

<b>CO1</b>	H	M	L	M	L	M
<b>CO2</b>	L	H	M	M	M	L
<b>CO3</b>	M	L	L	M	L	H
<b>CO4</b>	L	M	M	H	M	L
<b>CO5</b>	M	L	M	L	M	H

<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	L	H	L	M	H
<b>CO2</b>	L	H	L	M	M	L
<b>CO3</b>	M	M	M	L	H	M
<b>CO4</b>	L	L	H	H	L	M
<b>CO5</b>	H	M	L	M	M	H

**Low -L, Medium -M, High-H**

## **COURSE SYLLABUS**

### **UNIT I**

**Hours: 5**

- 1.1 Data Visualization: Introduction. (K1)
- 1.2 Benefits of Data Visualization. (K2)
- 1.3 Data Visualization Tools. (K2)
- 1.4 Features. (K2)
- 1.5 Data access from data sources. (K2)

### **UNIT II**

**Hours: 5**

- 2.1 Data Transformation. (K1, K2)
- 2.2 Types of charts. (K2)
- 2.3 Bar Chart. (K1, K2)
- 2.4 Pie Chart. (K2)
- 2.5 Data Tables. (K2)
- 2.6 Scatter Chart. (K2)

### **UNIT III**

**Hours: 5**

- 3.1 Time series Chart. (K2)
- 3.2 Score card. (K2)
- 3.3 Scatter Chart. (K2)
- 3.4 Bullet Chart. (K2)
- 3.5 Area Chart. (K2)
- 3.6 Heat Map. (K2)

### **UNIT IV**

**Hours: 8**

- 4.1 Create a bar chart for the given data.



- 4.2 Create a pie chart for the given data.
- 4.3 Create a scatter chart for the given data.
- 4.4 Create a time series chart for the given data.

## **UNIT V**

**Hours: 7**

- 5.1 Create a bullet chart for the given data.
- 5.2 Create area chart for the given data.
- 5.3 Create a heat map for the given data.

### **Book for Study:**

1. Nathan Yau Visualize This: The FlowingData Guide to Design, Visualization, and Statistics Wiley, 1st Edition 2011.

### **Books for Reference:**

1. Cole Nussbaumer Knaflic Storytelling with Data: A Data Visualization Guide for Business Professionals John Wiley & Sons 2015.

### **OER:**

1. [https://www.tutorialspoint.com/tableau/tableau\\_tutorial.pdf](https://www.tutorialspoint.com/tableau/tableau_tutorial.pdf)
2. <https://www.pdfdrive.com/tableau-books.html>
3. <http://projanco.com/Library/Learning%20Tableau%202019%20Tools%20for%20Business%20Intelligence,%20data%20prep,%20and%20visual%20analytics.pdf>

## **ASSESSMENT FOR SKILL-BASED ELECTIVE**

### **Pattern of Question Paper**

#### **SBE: Total Marks 60**

Section A (Any 10 out of 15) -  $10 \times 2 = 20$

Section B

Practical: **35 Marks**

Record: **5 Marks**

## **ASSESSMENT FOR NON-MAJOR ELECTIVE**

#### **NME - Total Marks 60**

Section A (Answer ALL) -  $5 \times 2 = 10$

Section B (Answer 3 out of 5)  $3 \times 5 = 15$

Section C

**Practical:** 30 Marks

**Record:** 5 Marks