DEPARTMENT OF COMPUTER APPLICATIONS

Preamble

UG : Course profile, list of courses offered to the other departments and the syllabi of courses in the I & II semesters along with evaluation components III & IV (with effect from 2018-2021 batch onwards) and

PG : Course profile, list of courses offered to the other departments and the syllabi of courses in the I, II, III & IV semesters along with evaluation components III & IV (with effect from 2018-2021 batch onwards) are presented in the booklet.

COURSE PROFILE: BCA

PSO1   : Understanding of the key concepts and principles of programming languages.
PSO2   : Capacity to analyze a problem, identify the computing requirements and using Procedures find a solution.
PSO3   : Development of practical skills to solve problems and provide solutions using current trends in the discipline of Computer Applications.
PSO4 : Ability to apply the algorithmic principles, mathematical foundations and computer science theory for designing computer-based systems.

Semester	Part	Category	Course Code	Course Title	Contact / Week	Credit Min	Credit Max
I	I	Language	UTAL105/ UTAL106/ UHIL101/ UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I/ French-I	4	2	3
	II	English	UENL107/ UENL108	General English-I/ Advanced English-I	5	2	3
	III	Core I	UCAM107/ UCSM106	Programming in C	6	5	5
	III	Core II	UCAM108/ UCSM108 UCAM109/ UCSM109	Fundamental of Computer Science/ Advanced Computer Science	5	4	4
	III	Core Practical I	UCAR105/ UCSR108	Programming in C- Practical	3	2	2
	III	Allied I	UMAA110	Mathematical Methods-I	5	4	4
	IV	Value Education			2	1	1
				Total	**30**	**20**	**22**
II	I	Language	UTAL205/ UTAL206/ UHIL201/ UFRL201	Basic Tamil-II/ Advanced Tamil-II/ Hindi-II/ French-II	4	2	3

	II	English	UENL207/ UENL208	General English-II/ Advanced English-II	5	2	3
	III	Core III	UCAM205/ UCSM206	Data Structures	6	6	6
	III	Core Practical II	UCAR204/ UCSR205	Data Structures - Practical	4	3	3
	III	Allied II	UMAA216	Mathematical Methods-II	5	4	4
	IV	Non - Major Elective			4	2	2
	IV	Soft Skill			2	1	1
	V	Extension Programme/ Physical Education			-	1	2
				Total	**30**	**21**	**24**
III	III	Core IV	UCAM310/ UCSM305	Java Programming	6	6	6
	III	Core V	UCAM308	MIS and ERP	5	4	4
	III	Core VI	UCAM311	Multimedia and its Applications	5	4	4
	III	Core Practical III	UCAR304/ UCSR306	Java Programming - Practical	4	3	3
	III	Allied III	UCOA303	Financial Accounting	5	5	5
	IV	Online Courses		NPTEL/Spoken Tutorial	3	1	2
	IV	Value Education			2	1	1
				Total	**30**	**24**	**25**
IV	III	Core VII	UCAM404	Database Management System	6	6	6
	III	Core VIII	UCAM403	Object Oriented Analysis and Design	5	4	4
	III	Core IX	UCAM405	Data Communication Networks	6	5	5
	III	Core Practical IV	UCAR402	Database Management System - Practical	3	2	2
	III	Core Practical V	UCAR403	Case Tools - Practical	3	2	2
	III	Allied IV	UCOA403/ UCOR403	Accounting Package	5	5	5
	IV	Soft skill			2	1	1
	V	Extension Programme/ Physical Education			-	-	2
				Total	**30**	**25**	**27**
V	III	Core X	UCAM507	Operating System	5	5	5
	III	Core XI	UCAM504	Software Engineering	6	5	5
	III	Core XII	UCAM505	Web Programming	6	5	5
	III	Core XIII	UCAM508	Open Source Technology	5	5	5
	III	Core Practical VI	UCAR506	Open Source Technology - Practical	3	2	2

	III	Core Practical VII	UCAR505	Web Programming - Practical	3	2	2
	IV	Value Education			2	1	1
				Total	**30**	**25**	**25**
VI	III	Core XIV	UCAM609	Data Mining	5	4	4
	III	Core XV	UCAM610	Software Testing	5	4	4
	III	Core XVI	UCAM611	Internet of Things	4	3	3
	III	Core Practical VIII	UCAR602	Data Mining - Practical	4	3	3
	III	Core Project	UCAP601	Project Work	5	5	5
	III	Major-Elective	UCAO606/ UCAO604	Network Security/ Cloud Computing	5	4	4
	III	Viva-Voce	UCAM601	Comprehensive Viva Voce	-	1	1
	IV	Soft Skill			2	1	1
	V	Extension Programme/ Physical Education			-	-	2
				Total	**30**	**25**	**27**
				Grand Total	**180**	**140**	**150**

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Contact/ Week	Credit	
						Min	**Max**
II	III	Summer Internship	UCAI201	Summer Internship	-	-	1
IV	III	Summer Internship	UCAI401	Summer Internship	-	-	1
V	III	Self Study	UCSS501/ UCAS501	Python Programming	2	-	2
V	III	Self Study	UCSS502/ UCAS502	Android Applications	2	-	2
VI	III	Self Study	UCSS601/ UCAS601	Angular JS	2	-	2
VI	III	Self Study	UCSS602/ UCAS602	Green Computing	2	-	2

NON-MAJOR ELECTIVES-UG

Semester	Part	Category	Course Code	Course Title	Contact/ Week	Credit
II	IV	NME	UCAE207	Data Science using R	4P	2
			UCAE208	Cyber Forensics	4T	2
			UCAE209	PyMOL	4P	2
			UCAE210	Qlick View	4P	2

UCAM107/UCSM106 PROGRAMMING IN C

Semester : I   **Credit** : 5
Category : Core 1   **Hours/Week:** 6
Class & Major: I BCA   **Total Hours** : 78

Objectives
To enable the Students
- Understand the concepts of Structured Programming.
- Acquire Knowledge on Control Structure, Arrays, Functions, Pointers and Files
- Solve Logical problems using C language.

UNIT- I INTRODUCTION   15 Hrs

Overview of C – Character Set – C Tokens – Keywords and Identifiers – Constants – Variables – Data Types – Declaration of Variables – Declaration of Storage Class – Assigning Values to Variables – Defining Symbolic Constants – Declaring a Variable as Constant – Declaring a Variable as Volatile – Operators and Expressions.

UNIT- II DECISION AND LOOPING   15Hrs

Introduction – Decision making with if statement –Simple if statement – The if-else statement – Nesting of if-Else Statements – The Else if Ladder – The Switch Statement – The Goto Statement - The Ternary Operator. **Looping**: The While statement – The Do-While statement – The For statement – Jumps in Loops.

UNIT- III ARRAYS AND FUNCTIONS   16 Hrs

Introductions – One-Dimensional arrays – Declaration of One-Dimensional arrays – Initialization of One-Dimensional arrays – Two-Dimensional arrays – Initialization of Two-Dimensional arrays – Multi-Dimensional arrays – Dynamic Arrays – Character Arrays and Strings – User-Defined Functions.

UNIT- IV STRUCTURES AND UNIONS   16 Hrs

Introduction – Defining a Structure – Declaring Structure Variables – Accessing Structure Members – Structure Initialization – Copying and Comparing Structure Variables – Operations on Individual Members – Arrays of Structures – Arrays within Structures – Structure and Functions – Unions – Size of Structure.

UNTI- V POINTERS AND FILES   16 Hrs

Introduction to pointers – Accessing the Address of a Variable – Declaring pointer Variables – initialization of pointer Variables – Accessing a Variable though its pointer – chain of Pointers – Pointer Expressions – Pointers Increments and Scale Factor – Pointer and Arrays – Pointers and Character Strings – Arrays of Pointers. Files: Introduction – Defining and opening a file – Closing a File – Input/Output Operations on files. Dynamic Memory Allocation – Allocating a Block of memory: Malloc – Allocating Multiple Blocks of Memory – Altering the size of Block .C Preprocessor-Directives - Macros - Working with Several Files - Command Line Arguments.

Text Book

- Bala Gurusamy.E," *Programming in ANSI C"*, 6ᵗʰ Edition, Tata McGraw-Hill, New Delhi, 2012.

Reference Books

- Herbert Schildt.H, "*C The Complete Reference",* 4th Edition, Tata McGraw-Hill Edition, New Delhi, 2000.
- Byron S. Gottfried,*" Programming with C"*, 4th Edition, Tata McGraw Hill Edition, New Delhi, 2006.
- Brian W. Kernighan and Dennis M.Ritchie, *"The C Programming Language"*, 2nd Edition, Prentice hall of India Pvt.ltd, New Delhi, 2005.

UCAM108/UCSM107 FUNDAMENTALS OF COMPUTER SCIENCE

Semester   :I   **Credit   : 4**
Category   :Core II   **Hours/Week : 5**
Class &Major:I BCA   **Total Hours :65**

Objectives
To enable the students

- Obtain basic knowledge about Computer Classification and Applications.
- Acquire knowledge on Number Systems and Elements of Computer Architecture
- Inculcate knowledge on Internet and E-Mail.

UNIT- I INTRODUCTION   **13 Hrs**
Introduction To Computers - Characteristics of Computers - Evolution of Computers- Generation of Computers - Classification of Computers - The Computer System- Applications of Computers.

UNIT- II PROGRAMMING LANGUAGES   **13 Hrs**
Introduction - Evolution of Programming Languages- Classification of Programming Languages - Generations of Programming Languages - Features of a Good Programming Language- Selection of a Programming Language.

UNIT- III NUMBER SYSTEMS   **13 Hrs**
Introduction - Decimal Number System - Binary Number System - Complements - Signed and Unsigned Number Representations - Fixed-Point Representation of Numbers - Floating-point Representation of Numbers - Binary Coded Decimal (BCD) - Gray Code - Excess-3 Code - ASCII Code - EBCDIC Code - Bits, Bytes, and Words - Octal Number System - Hexadecimal Number System.

UNIT –IV FUNDAMENTALS OF COMPUTER ARCHITECTURE   **13 Hrs**
Introduction- Central Processing Unit (CPU) Memory- Communication between Various Units of a Computer System- The Instruction Format- Instruction Set- Processor Speed- Multiprocessor Systems. Primary Memory Introduction- Memory Hierarchy- Random Access Memory (RAM)- Types of RAM- Read Only Memory (ROM)- Types of ROM. Secondary

Storage Introduction- Classification of Secondary Storage Devices- Magnetic Tape- Magnetic Disk- Optical Disk- Magneto Optical disk. Input Devices - Output Devices.

UNIT -V INTERNET AND E-MAIL   13 Hrs

Introduction - Internet Access - Internet Protocols - Internet Addressing - World Wide Web - Web pages and HTML - Web Browsers - Searching the Web - Internet Chat - Overview of Electronic Mail - Internet - E-Commerce and E-Business.Computer Program Introduction- Developing a Program- Algorithm- Flowchart- Psedocode (P-Code)

Text Book
- Alexis Leon and Mathews Leon, *"Fundamentals of Information Technology",* Vikas Publishing House Pvt. Ltd, 2009

Reference Books
- Dennis P. Curtin ,Kim foley, Kunal Sen and Cathleen Morin - *"Information Technology - the breaking wave"*, Tata-McGraw Hill Publications, 2005 Seventeenth Reprint., (ISBN 0-07- 463558-1)..
- Alexis Leon And Mathews Leon. *"Fundamentals of Information Systems"* co-published by Vijay Nicole Imprints Pvt Ltd, 2004.

UCAM109/UCSM108 ADVANCED COMPUTER SCIENCE

Semester : I		**Credit** : 4
Category :Core II		**Hours/Week** : 5
Class & Major :I BCA		**Total Hours** :65

Objectives
To enable the Students
- Obtain knowledge on Object Oriented Programming concepts.
- Understand the basics of Microprocessor and Compiler.
- Acquire knowledge on Information Security and Open Source Software.

UNIT - I INTRODUCTION TO OBJECT ORIENTED CONCEPTS   12 Hrs

Principles of Object Oriented Programming: Basic concepts of OOP - Benefits of OOP - Object Oriented Language Applications of OOP. Classes and Objects - Constructors and Destructors - Type Conversions – Method Overloading – Inheritance - Exception Handling.

UNIT - II MICROPROCESSOR   12 Hrs

Introduction to Microprocessor – Microcontroller - 8085 Microprocessor and Architecture - Opcode fetch - Machine cycle - Memory read machine cycle - Memory write machine cycle - IO read machine cycle - IO Write machine cycle - Execution time of the instruction cycle.

UNIT - III INTRODUCTION TO COMPILERS   11 Hrs

Compilers – Analysis of source program – The Phases of compilers – Cousins of Compilers – The grouping of phases – Analysis of Source Program.

UNIT - IV INFORMATION SECURITY **15 Hrs**

   Introduction to Information Security - Components of an Information System - Balancing Information Security and Access - The Systems Development Life Cycle - The Security Systems Development Life Cycle - Security Professionals and Organization.

UNIT - V OPEN SOURCE SOFTWARES **15 Hrs**

   Introduction to Open sources – Need of Open Sources – Advantages of Open Sources – Application of Open Sources. Open Source Operating Systems : LINUX – Introduction: MySQL - PHP – Python.

Text Books
- Michael E Whitman and Herbert J Mattord, "*Principles of Information Security*", 4th Edition, Course Technology, Cengage Learning, 2012.
- Rasmus Lerdorf and LevinTatroe, "*Programming in PHP*", Reilly, 2012
- Ramesh.S.Goankar, "*Microprocessor Architecture, Programming & Applications with 8085*", Fifth Edition, Penram International, 2011.

Reference Books
- Alfred V.Aho, Ravi Sethi, Jeffery D.Ullman, "*Compilers, Principles and Techniques and Tools*", Addison-Wesley, New Delhi, 2006.
- Herbert Schildt, "*The Complete Reference C++*", Fifth edition, Tata McGraw-Hill Publishing, New Delhi, 2015.

UCAR105/ UCSR109 PROGRAMMING IN C – PRACTICAL

Semester	**:I**	**Credit**	**: 2**
Category	**:Core Practical 1**	**Hours/Week :**	**3**
Class & Major :I BCA		**Total Hours : 39**	

Objectives
To enable the Students
- Implement the basic concepts of C Programming language.
- Develop programs by using Control Structure, Arrays, Functions, Pointers and Files
- Design, build, Execute and Debug C programs.

I.	**Arithmetic and Trigonometric Operations**	**6 Hrs**

  1. Perform Arithmetic Operations
  2. Solve Quadratic Equations.
  3. Find the largest and smallest number.

II.	**Looping**	**6 Hrs**

  1. Pascal Triangle
  2. Armstrong Number Checking
  3. Decimal to Binary Conversion

III. Arrays and functions.   18 Hrs
1. Sorting and Searching
2. Perform the operation of Matrix Manipulation.
   a. Addition and Subtraction.   b. Multiplication
3. Perform the operation Recursive and Non-Recursive functions to find
   a. Factorial
   b. Fibonacci
4. Perform the String manipulation(without using string function)
   a. Concatenation
   b. Palindrome Checking
   c. Count the number of vowels, consonants, characters and white spaces in a line

IV. Structure   3 Hrs
1. Generate mark sheet processing for set of students using Structure

V. Pointers and Files   6 Hrs
1. Perform Arithmetic Operation using Pointer.
2. Copies the contents of one file to another file using command line arguments.

UCAM205/ UCSM206 DATA STRUCTURES

Semester	:II	**Credit**	: 6
Category	:Core III	**Hours/Week**	: 6
Class & Major	:I BCA	**Total Hours**	:78

Objectives
To enable the Students
- Impart the basic concepts of data structures.
- Understand basic concepts about stacks, queues, Lists, trees and graphs.
- Understand the concepts of searching and sorting techniques.

UNIT- I INTRODUCTION   **15 Hrs**

Introduction – Classification of Data Structure – Operations on Data Structures – Abstract Data Type – Algorithms – Different Approaches to Design an Algorithms – Time and Space Complexity – Asymptotic Notations: Big-Oh, Omega and Theta – Best, Worst and Average case Analysis.

UNIT- II STACKS, QUEUES AND LINKED LISTS   **16 Hrs**

Stacks: definition – Array representation of stacks – Evaluation of a postfix expression – Transforming infix expressions into postfix expressions. **Queues:** definition – array representation of queues – circular queues.

Linear Lists: linked lists – Representation of linear lists in memory – Traversing a linked list – Searching a linked list – Insertion into a linked list – Deletion from linked list – Circular linked lists – Doubly linked lists.

UNIT- III TREES **16 Hrs**

Introduction and definition of trees – Tree terminology – Binary tree – Representing binary tress in memory – Traversing binary tree: preorder, in-order, post-order traversal –Binary search trees – Searching and Inserting in Binary Search trees – Deleting in a Binary search tree.

UNIT- IV GRAPHS **16 Hrs**

Introduction to Graph, Directed Graphs, Sequential representation of graphs: Adjacent matrix, Path matrix, Linked representations of a Graph, Operations on Graphs: Searching in a Graph, Inserting in a graph, Traversing a graph: Breadth- First search, Depth-First search.

UNIT –V SORTING AND SEARCHING **15 Hrs**

Sorting: Bubble Sort, Insertion Sort, Quick Sort, Selection Sort, Merge-Sort. **Searching:** Sequential and Binary Searches, Indexed Search, Hashing Schemes.

Text Book
- Ashok N Kamthane, "*Introduction to data structures in C*", Pearson Education, Indian Print, Dorling Kindersley publications, New Delhi 2012.

Reference Book
- Ellis Horowitz and Sartaj Sahni, "*Fundamentals of data structures",* Galgotia Book Source, 2005.

UCAR204/UCSR206 DATA STRUCTURES – PRACTICAL

Semester	**: II**	**Credit**	**: 3**
Category	**:Core Practical II**	**Hours/Week**	**: 4**
Class & Major : I BCA		**Total Hours**	**: 52**

Objectives
To enable the Students
- Implement basic concepts of linear data structures.
- Develop programs using the Non Linear concept.
- Solve the sorting and searching algorithms.

To implement the Programs
I. **Linear Data Structures** **16 Hrs**
    1. Stack using arrays.
    2. Queue using arrays.
    3. Single linked list.
II. **Non-Linear Data Structures** **4 Hrs**
    4. Binary tree.
    5. Graph Using Adjacency Matrix.
III. **Sorting** **16 Hrs**
    6. Merge sort using arrays.
    7. Insertion sort using arrays.
    8. Quick sort using arrays.
    9. Selection Sort using arrays.

IV.   Searching   **16 Hrs**
10. Linear search using arrays.
11. Binary search using arrays.
12. Depth first search.
13. Breadth first search.

UCAE207 DATA SCIENCE USING R

Semester	**: II**	**Credit**	**: 2**
Category	**: NME**	**Hours/Week**	**: 4P**
Class & Major :	**I UG**	**Total Hours**	**: 52**

Objectives
To enable the Students
- Implement sorting and searching algorithms using R
- Perform data exploratory analysis using R

LAB EXERCISES

1. Implement the following sorting algorithms   **9 Hrs**
   a. Selection sort
   b. Insertion sort
   c. Bubble Sort
2. Implement the following searching algorithms   **9 Hrs**
   a. Linear search
   b. Binary search
3. Implement the following Data Exploratory Analysis   **34 Hrs**
   a. Save and Load the Data
   b. Import from and Export to .CSV Files
   c. Import and Export Data from Databases
   d. Read and Write data using Excel Files
   e. Explore Individual and Multiple Variables from Data Set
   f. Visualization of Data Set

e-Resources

- https://www.udemy.com/r-programming-from-a-to-ztm-practical-and-concise/
- https://thepracticalr.wordpress.com/
- https://www.ed.youth4work.com
- www.programmingr.com/examples
- https://www.coursera.org/learn/r-programming
- https://www.analyticsvidhya.com/blog/.../complete-tutorial-learn-data-science-scratch

UCAE208 CYBER FORENSICS

Semester : II   **Credit** : 2
Category : NME   **Hours/Week** : 4T
Class & Major : I UG   **Total Hours** : 52

Objectives
To enable the Students
- Demonstrate data recovery from hardware
- Understand various software threats
- Learn the working of surveillance tools

UNIT- I TYPES OF COMPUTER FORENSICS   **10 Hrs**

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

UNIT- II DATA RECOVERY   **12 Hrs**

Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication.

UNIT - III ELECTRONIC EVIDENCE   **10 Hrs**

Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks.

UNIT- IV THREATS   **10 Hrs**

Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies.

UNIT - V SURVEILLANCE   **10 Hrs**

The Future – Arsenal – Surveillance Tools – Victims and Refugees – Advanced Computer Forensics

Text Books
- Majid Yar, *Cybercrime and Society*, Sage Publications, 2013.
- Chad Steel, *Windows Forensics*, Wiley India, 2006.

Reference Books
- John R. Vacca, *Computer Forensics*, Firewall Media, 2005.
- Sunit Belapure and Nina Godbole, *Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives,* Wiley, 2011.
- Marjie T Britz, *Computer Forensics and Cyber Crime: An Introduction*, Pearson Education India, 2011.

UCAE209 PyMOL

Semester   : II
Category   : NME
Class & Major : I UG

Credit   : 2
Hours/Week : 4P
Total Hours : 52

Objectives
To enable the Students
- Understand the installation steps of PyMOL
- Implement simple PyMOL Commands
- Write Python Script to interact PyMOL

Lab Exercises
1. Install PyMOL
2. Load Protein from public structure repository (pdb format) using Load and Fetch commands.
3. Change the color of a protein chain
4. Change the view of a protein (Rotate and Move) using Rota and Move Commands.
5. Save an Image
6. Selecting parts of an object
7. Write simple Python script to rotate a molecule.
8. Write a simple Python code interacts with PyMOL to show animated molecule.

e-Resources

- https://pymol.org/
- *https://sourceforge.net / Browse/ Graphics/ Graphics / 3D Modeling*
- https://pymolwiki.org/index.php/Practical_Pymol_for_Beginners
- https://pages.jh.edu/pfleming/bioinform/files/PyMOL_Tutorial.pdf
- https://ist.mit.edu/pymol/all

UCAE210 QLICK VIEW

Semester   : II
Category   : NME
Class & Major : I UG

Credit   : 2
Hours/Week : 4P
Total Hours : 52

Objectives
To enable the students
- Learn Business Intelligence Solution
- Understand the Data Visualization Technique using Qlick View.
- Apply Qlick View function for Data Projection

Lab Exercise
1. Install Qlick View

2. Load data from different sources in Qlick View

3. Apply Visualization techniques

a. Gauge Chart

b. Waterfall Chart

c. Cyclic and Drill Groups

4. Apply Data Transformation

a. Loading Cross Table

b. Loading Inline Table

c. Loading data from already stored data in Qlick View (Resident Load)

d. Joins, Concatenation of tables

e. Use of Mapping Tables

5. Apply aggregate function

6. Apply Access restriction (Section Access)

e-Resources

- https://www.loc.gov/acq/devpol/electronicresources.pdf
- www.iconresources.com/new/irt_bi.htm
- https://www.analyticsvidhya.com/learning-paths-data.../qlikview-learning-path
- https://www.qlik.com/us/services/training
- https://www.udemy.com/qlikview-for-beginners-by-techstuffy

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
I	III	Core I	UCAM107	Programming in C	Assignment	Problem Solving
	III	Core II	UCAM108	Fundamental of Computer Science	Number Conversion	Assignment
	III	Core III	UCAM109	Advanced Computer Science	Assignment	Assignment
	III	Core Practical I	UCAR105	Programming in C-Practical	DPA	Viva-voce
II	III	Core III	UCAM205	Data Structures	Assignment	Problem Solving
	III	Core Practical II	UCAR204	Data Structures - Practical	DPA	Viva-voce

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
II	IV	NME	UCAE207	R Programming	DPA	Viva-Voce
			UCAE208	Cyber Forensics	Assignment	Case Study
			UCAE209	PyMOL	DPA	Viva-Voce
			UCAE210	Qlick View	DPA	Viva-Voce

COURSE PROFILE: MCA

PSO1 : Understanding of the key concepts of Computer Applications and Computing
Principles.
PSO2 : Analysis, Design and Development of problem solving skills in the discipline of
computer applications.
PSO3 : Applying the practices and strategies of computer science for software project
development to deliver a quality software product and contribute to research in the
chosen field and perform effectively.
PSO4 : Application of computing knowledge efficiently and effectively in projects
management and progress as a computer professional.

Semester	Category	Course Code	Course Title	Contact/ Week	Credit	
					Min	Max
I	Core I	PCAM103	Mathematical Foundation	4	3	3
	Core II	PCAM108	Marketing Management	5	3	3
	Core III	PCAM110	C Programming	5	4	4
	Core IV	PCAM111	Web User Interface Design	5	3	3
	Core V	PCAM112	Computer Organization and Architecture	4	3	3
	Core Practical I	PCAR105	C Programming –Practical	3	2	2
	Core Practical II	PCAR106	Web User Interface Design Practical	3	2	2
			Library	1	-	-
			Total	**30**	**20**	**20**
II	Core VI	PCAM205	Database Management System	5	4	4
	Core VII	PCAM209	Operations Research	5	4	4
	Core VIII	PCAM207	Object Oriented Programming using C++	4	3	3
	Core IX	PCAM208	Data Structures and Algorithms	4	3	3
	Core Practical III	PCAR203	Database Management System-Practical	3	2	2
	Core Practical IV	PCAR204	Object Oriented Programming using C++ -Practical	3	2	2
	Non Major Elective			5	4	4
			Library	1	-	-
	Service Learning	PCSX201/ PCAX201	Introduction To Information Technology	–	1	1
			Total	**30**	**23**	**23**
III	Core X	PCAM313	Advanced Java Programming	5	4	4
	Core XI	PCAM314/ PCSM113	Data Mining	4	4	4

Core XII	PCAM311	Operating System	4	4	4
Core XIII	PCAM315	Computer Networks	4	3	3
Core XIV	PCAM316	Cloud Computing	5	4	4
Core Practical V	PCAR306/ PCSR107	Data Mining using Weka Tool - Practical	4	3	3
Core Practical VI	PCAR307	Advanced Java Programming- Practical	3	2	2
		Library	1	-	-
		Total	**30**	**24**	**24**
IV	Core XV	PCAM412	Big Data Analytics	4	4	4
	Core XVI	PCAM413	Software Engineering	5	4	4
	Core XVII	PCAM414	Open Source Technology	5	4	4
	Core XVIII	PCAM410	Web Technology	5	4	4
	Core XIX	PCAM411	Principles of Compiler Design	4	3	3
	Core Practical VII	PCAR407	Open Source Technology - Practical	3	2	2
	Core Practical VIII	PCAR406	Web Technology -Practical	3	2	2
			Library	1	-	-
			Total	**30**	**23**	**23**
V	Core XX	PCAM512	Android Programming	5	5	5
	Core XXI	PCAM513	Network Security and Cryptography	5	4	4
	Core XXII	PCAM511	Digital Image Processing	5	4	4
	Core XXIII	PCAM514	Soft Computing	4	4	4
	Core XXIV	PCAI501/ PCSI301	Fuzzy Set and System	5	4	4
	Core Practical IX	PCAR504	Android Programming - Practical	3	2	2
	Core Practical X	PCAR505	Mini project	2	2	2
			Library	1	-	-
			Total	**30**	**25**	**25**
VI	Core Project	PCAP601	Project work	30	20	20
			Grand Total	**180**	**135**	**135**

EXTRA CREDIT EARNING PROVISION

Semester	Category	Course Code	Course Title	Contact/ Week	Credit Min	Credit Max
III	Extra Credit	PCAS301	Working Model/ Self Study Paper	-	1	1
IV	Extra Credit	PUSI401	Summer Internship	-	1	1
V	Extra Credit	PCAS501	Application Development/ Paper Presentation	-	1	1
V	Self Study	PCSS301/ PCAS502	R-Programming	2	-	2
V	Self Study	PCSS302/ PCAS503	Rich Internet Applications	2	-	2
VI	Self Study	PCSS401/ PCAS601	Silver Light Applications	2	-	2
VI	Self Study	PCSS402/ PCAS602	Extreme Programming	2	-	2

NON-MAJOR ELECTIVES-PG

Semester	Part	Category	Course Code	Course Title	Contact Week	Credit Min	Credit Max
II	IV	Non – Major Elective	PCAE103	Open Source Programming	5	4	4

EXPERENTIAL LEARNING (Mandatory)

Semester	Category	Course Code	Course Title
IV	Core	PCAM414	Open Source Technology

PCAM110 C PROGRAMMING

Semester :I	**Credits** : 4
Category :Core III	**Hours/Week: 5**
Class & Major :I MCA	**Total Hours : 65**

Objectives:
To enable the students
- Understand basic concepts of the C programming language.
- Design, build, execute and debug C applications.
- Develop variables, arrays, strings, flow control statement, point and disk files in C applications.

UNIT-I INTRODUCTION   **10 Hrs**

C fundamentals character set-identifier and keywords-data types-constants-variables-Declarations-Basic data types-Enumerated data types-Expressions- operators   in   C   -Library function-managing input and output operations.

UNIT-II LOOPING STATEMENTS   **10 Hrs**

C Control Structures: Decision making with IF statement-IF….ELSE statement-   Nested IF statements-For statements-Do…while statements-while…do   statements-GOTO statements-SWITCH statements.

UNIT-III FUNCTIONS   **14 Hrs**

C function: Definitions – Prototypes - Passing Arguments - Recursion-Parameters or Arguments to function-Return Values-Prototype of function-Rules of using a function. Storage Classes: Automatic, External, Static, Register Variables - Scope of a variable.

UNIT-IV ARRAYS   **15 Hrs**

Arrays-Defining and Processing-Passing arrays to functions-Multidimensional   arrays-Arrays and Strings. Structures and Functions-Passing structures to Function-Unions-Bitwise operations.

UNIT- V POINTERS   **16 Hrs**

Pointers Declarations – Initialization - Passing Pointers to functions-pointers and arrays-Array of pointers-structures and pointers-Files: Creating, Processing, Opening and Closing data file. Dynamic Memory Allocation – Allocating a Block of memory: Malloc – Allocating Multiple Blocks of Memory – Altering the size of Block .C Preprocessor-Directives-Macros-Working with Several Files-Command Line Arguments.

Text Book

- E.Balagurusamy *"Programming in ANSI C"*, TMG, 2007.

Reference Books

- Gottfried. B.S., *"Programming with C",* 2/e, Schaum Outline series, TMH, 2005.
- Kernighan B.W. and Ritchie D.M, "*The C Programming Language: ANSI C*" Version, Second Edition, and PHI/Pearson Education Pvt.Ltd.
- Somashekara, "*Programming in C"*, PHI, 2006.
- Behrouz A. Forouzan and Richard. F. Gilberg, *"A Structured Programming Approach Using C"*, II Edition, Brooks–Cole Thomson Learning Publications,2007.

E- Resources
- https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf
- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk
- https://www.youtube.com/watch?v=n1cQPwZwTs4

PCAM111 WEB USER INTERFACE DESIGN

Semester :I	**Credits :3**
Category :Core IV	**Hours/Week :4**
Class & Major:I MCA	**Total Hours :52**

Objectives
To enable the students

- Know the UI Design principles, the features of HTML and Scripting.
- Design the webpage using JavaScript.
- Develop Applications in web user interface.

UNIT-I WEB MEDIUM **10 Hrs**

Core web technologies - web browsers - Markup Languages- Style sheet technologies - images -sound - video - programming technologies- client side, server side - network and related protocols - Introduction tostatic, dynamic and active web pages.

UNIT-II HTML **10 Hrs**

Introduction to HTML - Lists - Adding graphics to HTML documents.

UNIT- III TABLES **10 Hrs**

Tables - Linking documents - Frames - Form and its elements.

UNIT - IV JAVASCRIPT　　　　　　　　　　　　　　　　　　　　　10Hrs

Introduction to JavaScript - JavaScript in web pages – writing JavaScript with - HTML - Basic programming techniques - operators and expressions - conditional checking - loops - functions - user definedfunctions - dialog boxes.

UNIT- V JAVASCRIPT　　　　　　　　　　　　　　　　　　　　　　12Hrs

JavaScript DOM: JSSS DOM - understanding objects in HTML- browser objects - web page object hierarchy - handling events - The formobject - built-in objects - user defined objects - cookies - setting a cookie.

Text Books

- Thomas A Powell, "*Web Design - The Complete Reference*", Tata McGraw-Hill, Second Edition, 2003.
- Ivan N. Bayross, "*Web enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP*", 4th Revised Edition, BPB Publications, New Delhi, 2010.

Reference Books

- Thomas A Powell, "The Complete Reference - HTML", Osborne-McGraw-Hill, Third Edition, 2000.
- Gary B. Shelly, H. Albert Napier, Ollie N. Rivers, "*Web Design: Introductory Concepts and Techniques*", Cengage Learning, 2008.

E- Resources
- https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf
- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk
- https://www.youtube.com/watch?v=n1cQPwZwTs4

PCAM112 COMPUTER ORGANIZATION AND ARCHITECTURE

Semester : I	**Credit** : 4
Category : Core V	**Hours/Week** : 4
Class & Major : I MCA	**Total Hours** : 52

Objectives
To enable the students
- Understand basic concepts of Computer Architecture.
- Inculcate Knowledge on digital concepts.
- Learn the input and output organization.

UNIT - I INTRODUCTION   10 Hrs

Data representation: Data types – Complements – Fixed-point representation – Floating-point representation - Logic gates - Combinational circuits - Flip-flops – Multiplexers – Decoders.

UNIT - II REGISTERS   10 Hrs

Registers – Shift registers – Binary counters – Register transfer – Bus and memory transfers – Arithmetic micro operations- Logic and shift micro operations - Arithmetic logic shift unit.

UNIT - III CENTRAL PROCESSING UNIT   10 Hrs

Register and stack organization – Instruction formats – Addressing modes – Data transfer and manipulation – Program control – RISC

UNIT - IV ARITHMETIC PROCESSING   10 Hrs

Addition, subtraction, multiplication and division of signed-magnitude data Parallel processing: Pipelining – Arithmetic and instruction pipeline – RISC pipeline – Array Processors

UNIT - V INPUT/OUTPUT ORGANIZATION   12 Hrs

Peripheral devices – I/O interface – Asynchronous data transfer Memory organization: Memory hierarchy – Main memory – Auxiliary memory – Associative memory – Cache memory – Virtual memory

Text Books
- M. Morris Mano and Rajib Mall, *Computer System Architecture*, Pearson Publication, Third Edition, 2017.
- William Stallings, *Computer Organization & Architecture – Designing for Performance,* 9th Edition 2012.

Reference Book
- David A. Patterson and John L. Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, Fourth Edition, Morgan Kaufmann / Elsevier, 2009.

PCAR105 C PROGRAMMING

Semester :I	**Credits : 2**
Category :Core Practical I	**Hours/weeks : 3**
Class & Major :I MCA	**Total Hours : 39**

Objectives
To enable the students
- Develop the students to write a program in C solve the problems

Lab Exercise

1. Program to print Pascal Triangle & Floyd's Triangle.
2. Program to conversion of Number System in c
3. Solution of Quadratic Equations (for all cases).
4. Sorting of names in Alphabetical order.
5. Matrix operations (Addition, Subtraction, Multiplication – using functions.)
6. Finding factorials, generating Fibonacci Numbers using recursive functions.
7. Summation of Series : sin(x), cos(x), exp(x) [Comparison with built-in-functions]
8. String manipulations without using string functions (string length, string comparison, string copy, palindrome checking, counting words and lines in strings (Use function pointers).
9. Program to prepare purchase report using pointers
10. Creation , insertion and deletion in a linked list using Pointers
11. C program for ATM transactions.
12. Book Shop inventory using Structures.
13. Creation and processing of Sequential files for payroll and Mark list preparation (use structures for Record Description).

PCAR106 WEB USER INTERFACE DESIGN – PRACTICALS

Semester   :I   **Credits   : 2**
Category   :Core Practical II   **Hours/Week : 3**
Class & Major :I MCA   **Total Hours   : 39**

Objectives
To enable the students

- Understand simple Website design
- Create dynamics website using Scripts

HTML and DHTML   **20 Hrs**

1. Designing and formatting the contents of a webpage using basic tags

2. Creating a webpage for displaying the Time-table for current semesterwith 'Table' tags

3. Designing a webpage using Frame tag

4. Designing an application form for opening a SB account using 'form'tag

5. Creating a webpage using audio and video tags

JavaScript   **19Hrs**

5. Data validation using JavaScript

6. Writing a simple JavaScript with Conditional and Branching constructs

7. Adding interactivity to a web page (Events)

8. Working with Dialog boxes

9. Adding Scripts to Forms

10. Designing a simple calculator

PCAM205 DATABASE MANAGEMENT SYSTEM

Semester : II	**Credit** : 4	
Category : Core V	**Hours/Week** : 5	
Class & Major : I MCA	**Total Hours** : 65	

Objectives
To enable the students
- Acquire knowledge on basic AND practical skills on RDBMS
- Describes the data storage AND indexing techniques.
- Develop the query Optimization and Transaction management.

UNIT-I INTRODUCTION   10Hrs
    Database System vs. File Systems – View of Data – Data Models – Database Language– Transaction Management – Database Systems Structure – History of Database Systems Database Systems Applications – Entity Relationship Model

UNIT-II RELATIONAL DATABASE   15 Hrs
    SQL – Basic Structure – Set Operations – Complex Queries – Joined Quires – DDL Embedded SQL – Dynamic SQL – Other SQL Functions – Query by Example – Integrity and Security of Searching – Relational Database Design

UNIT- III DATA STORAGE AND INDEXING   15Hrs
    Storage AND File Structure- Disks – DAID – File Organization – Indexing AND Hashing – B+ TREE –B TREE –Static Hashing – Dynamic Hashing – Multiple Key Access

UNIT-IV QUERY EVALUATION AND OPTIMIZATION   10Hrs
    Query Processing- Selection Operation – Sorting – Join Operation – Evaluation of Expressions Query Optimization.

UNIT-V TRANSACTION MANAGEMENT   15Hrs
    Transaction Concept – Static Implementation – Concurrency control Processor – Desertion Handling – Recovery Systems – Recovery with concurrent Transactions – Shadow paging – Buffer Management - Case Studies – Oracle – Microsoft SQL Server

Text Books
- Abraham Silberschartz, Hentry F. Korth and S. Sundharssan, "*Database System Concepts*", 4th Edition, Tata McGraw Hill, 2002.

- Raghu Ramakrishnan AND Johnnesgerhrke, "*Data Base Management Systems*", McGrwaw Hill International Edition, 2000**.**

Reference Books

- Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "*Database System Implementation*"- Pearson Education- 2006.
- Ramez Elmasri and Shamkant B. Navathe, "*Fundamental Database Systems*", Third Edition, Pearson Education, 2006.
- Silberschatz, Korth and Sudarshan, "*Database Management System*", Tata McGraw-Hill Publishing Company, 2005.

E- Resources
- https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf
- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk
- https://www.youtube.com/watch?v=n1cQPwZwTs4

PCAM207 OBJECT ORIENTED PROGRAMMING USING C++

Semester : II	**Credit** : 4
Category : Core VII	**Hours/Week** : 4
Class & Major: I MCA	**Total Hours** : 52

Objectives
To enable the students
- Understand the concept of OOPS.
- Write programs using C++.
- Develop C++ programs and its application.

UNIT-I OOPS   **10 Hrs**
          Concepts of OOP-Benefits of OOP-Application of OOP-Tokens, Expressions and Control Structures. Functions in C++-Main Function-Function Prototyping-Call by Reference-Return by Reference-Inline Function-Function Overloading-Classes and Objects-Specifying a Class-Defining member function-Nesting of member function-Arrays within a class-Memory Allocation for objects-Static Data   members-Static Member Function-Arrays of Objects-Objects as Function arguments-Friendly Function.

UNIT-II CLASSES   **10 Hrs**
          Constructors   and   Destructors-Constructors-Parameterized   Constructors-Multiple Constructors in a Class-Dynamic Initialization of Objects-Copy Constructor- Dynamic Constructors-Destructors-Operator Overloading and Type Conversions.

UNIT-III INHERITANCE   **10 Hrs**
   Inheritance-Introduction-Defining Derived Classes-Single Inheritance – Making a Private –
Member Inheritable-Multilevel, Multiple, Hierarchical, Hybrid Inheritance – Virtual Base Classes –

Pointers, Virtual Functions and Polymorphism

UNIT-IV I/O OPERATIONS   **11 Hrs**
         Managing Console I/O Operations-C++ Streams-C++ Stream Classes-   Unformatted I/O Operations -Formatted Console I/O Operations-Managing Output with Manipulators-Working with Files

UNIT-V FILES   **11 Hrs**
         Introduction-Classes for File Streams-Opening and Closing a File - File Modes - File Pointers and their Manipulators.

Text Book

- Balagurusamy. E ,"*Object Oriented Programming with C++*" TMH Publishing.2009.

Reference Book

- Robert Lafore , *Object Oriented Programming with C++,* Galgotia, TMH Publishing, 2007.

E- Resources
- https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf
- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk
- https://www.youtube.com/watch?v=n1cQPwZwTs4

PCAM208 DATA STRUCTURES AND ALGORITHMS

Semester   **:II**   **Credit**   **: 3**
Category   **:Core VIII**   **Hours/Week : 4**
Class & Major :I MCA   **Total Hours   : 52**

Objectives
To enable the students
- Understand the concepts of data structure
- Write programs with data structures concepts using C++
- Develop algorithm in data structure and its application.

UNIT-I ARRAYS   **11 Hrs**
         Introduction to Data structures – Overview – Types – Primitive and Non- Primitive Data structures and Operations. Arrays – Types – Strings – Array of   Structures   –   Sparse   and Dense Matrices – Row – Major and Column – Major   Arrays – Pointers and Arrays – Array of pointers – Pointers and Strings.   Recursion – Types – Rules – Recursion Vs.Iterations – Towers of Hanoi – Advantages and Disadvantages.

UNIT-II STACKS OPERATIONS   10 Hrs

Stacks – Operations – Pointers and Stack – Representation of Arithmetic   Expressions –
Infix, Prefix and Postfix Notations – Evaluation of Postfix   Expression   –   Conversion   of
Expression – Applications.Queues – Operations –   Disadvantages –Implementation – Types
and Applications.

UNIT-III LINKED LIST   10 Hrs

List operations – Linked list – Memory Allocation and De-Allocation –   Operations   –
Singly Linked List – Linked List with and without Header –   Operations – Circular Linked
List – Doubly Linked list – Circular Doubly Linked list – Applications. Storage Management –
Allocation Techniques – Storage   Allocations – Storage Release Compaction – Garbage
Collections.

UNIT-IV TREES   10 Hrs

Trees - Terms – Binary Trees – Types – Representation – Operation and Traversal –
Conversion of Expression – Binary Search Tree – Threaded Binary Tree – B-   Tree   –   B+
Tree, Graph – Terminologies – Representation – Traversal – Spanning   Trees.

UNIT-V SORTING AND SEARCHING   11 Hrs

Sorting – Methods: Insertion – Selection – Bubble – Quick – Tree – Merging List – Heap
– Radix – Partition Exchange. Searching – Linear and Binary Search –   Hashing   Method   –
Hashing Function – Division – Mid-Square – Folding – Length   - Dependent – Digit Analysis
method.

Text books
- Horowitz.E. , Sahni. S. and Mehta, "*Fundamentals of Data Structures in C++*", Galgotia-2007.
- Samanta D , " *Classic Data Structures*" , PHI, 2005

Reference books
- Gregory L.heileman, *"Data Structures,Algorithms and Object Oriented Programming"* Mc Graw Hill International Editions –2006
- Jean-Paul Tremblay and Paul G Sorenson, "*An Introduction to Data Structures with Applications*" 2 edn,Tata Mc Graw ,Hill Publishing Company Ltd.New Delhi:2007.

E- Resources
- https://www.cs.utah.edu/~swalton/Documents/Computer-Fundamentals.pdf
- http://www.w3schools.com/html/
- https://www.youtube.com/watch?v=oqJy4e6Aa0M
- https://www.youtube.com/watch?v=7r3Vln4bGLk
- https://www.youtube.com/watch?v=n1cQPwZwTs4

PCAR203 DATABASE MANAGEMENT SYSTEM-PRACTICALS

Semester : II   **Credit** : 2
Category : Core Practical III   **Hours/Week** : 3
Class & Major: I MCA   **Total Hours** : 39

Objectives
To enable the students
- Enable the students to know about simple queries and how to interact with database.

SQL
1. Simple queries using DDL, DML and DCL
2. SQL Aggregate functions
3. SET operations
4. Views
5. Multiple Tables and Nested Queries.
6. JOIN operations

PL/SQL
7. PL/SQL Block
8. Function
9. Procedures
10. Triggers
11. Cursors.

PCAR204 OBJECT ORIENTED PROGRAMMING USING C++ PRACTICALS

Semester : II   **Credit** : 2
Category : Core Practical IV   **Hours/Week** : 3
Class & Major : I MCA   **Total Hours** : 39

Objectives
To enable the students
- Write programs using Object Oriented Concepts
- Implement Data Structures algorithm using C++.

Lab Exercise

1. Functions and overloading
2. Constructors and Destructors
3. Inheritance and Virtual Functions.
4. File operations
5. Implement PUSH, POP Operations of Stack Using Arrays.
6. Implement Add, Delete Operations of Queue Using Pointers.
7. Postfix Expression Evaluation.
8. Addition of Two Polynomials using Arrays and Pointers.
9. Binary Tree Traversal Using Linked List (In-order, Pre-order, Post-order).
10. DFS.

PCAM313 ADVANCED JAVA PROGRAMMING

Semester : III **Credit** : 4
Category : Core X **Hours/Week** : 5
Class & Major : II MCA **Total Hours** : 65

Objectives
To enable the students
- Acquire the knowledge on Object Oriented Concepts, Applet and Database Connectivity.
- Gain knowledge on Servlets, JSP and Java Bean.

UNIT - I INTRODUCTION   **10 Hrs**
Classes and objects – Inheritance – Packages and Interfaces – Exception Handling – overloading methods – method overriding.

UNIT - II APPLET & AWT   **15 Hrs**
Multithreaded Programming – Synchronization – Applets class – AWT classes – Windows fundamentals – Frame windows – Working with graphics – AWT controls – Layout Managers.

UNIT- III DATABASE ACCESS   **10 Hrs**
Overview of the JDBC Process - JDBC Concepts - JDBC Driver types – Database Connection- JDBC/ODBC Bridge – Statement Objects – The Connection Interface – Result Set – Interacting with the database - Transaction Processing.

UNIT - IV JAVA SERVER PAGES   **15 Hrs**
Java Server Pages (JSP) – JSP tags – Components of a JSP page – Expressions –Scriptlets – Directives – Declarations – Working with JSP – JSP and JDBC – JQuery – AJAX.

UNIT - V JAVA BEAN AND SERVLETS   **15 Hrs**
Java Beans – Advantages of Java Beans – Application Builder Tools – BDK – JAR Files – Introspection – Developing a simple bean – Using bound properties. **Java Servelts** – Initialization – Development – Reading Client Data – Reading HTTP Request Headers – Cookies – Session Tracking – Database Connections.

Text Books
- Herbert Schildt, '*The Java Complete Reference'*, Ninth Edition, Tata McGraw Hill, New Delhi, 2014.
- Phil Hanna, *Instant Java Servlets,* Fourth Edition, Tata McGraw Hill, New Delhi, 2000.

Reference Books
- Deitel and Deitel , '*Java How to program*' , 4th Edition, Prentice Hall , 2001.
- Gary Cornell and Cay S. Horstmann, '*Core Java Vol 1 and Vol 2*', Ninth Edition, Sun Microsystems Press, 2014.

PCAM314/PCSM113 DATA MINING

Semester   : I   **Credits**   : 4
Category   : Core III   **Hours/weeks** : 5
Class & Major: II MCA   **Total Hours**   : 65

Objectives
To enable the students
- Gain knowledge in Data wareshouse and Datamining Techniques
- Analyze patterns in Data
- Depth Knowledge in Classification and Clustering algorithms.

UNIT- I DATA WAREHOUSE   12 Hrs
Data Warehousing - Operational Database Systems vs Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP operations – Data Warehouse Architecture – Indexing – OLAP queries and Tools.

UNIT- II DATA MINING AND DATA PREPROCESSING   13 Hrs
Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT- III ASSOCIATION RULE MINING   13 Hrs
Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint – Based Association Mining.

UNIT- IV CLASSIFICATION AND PREDICTION   14 Hrs
Classification vs Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT- V CLUSTERING   13 Hrs
Cluster Analysis - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – ConstraintBased Cluster Analysis – Outlier Analysis.

Text Books
- Jiawei Han and Micheline Kamber *"Data Mining Concepts and Techniques",*Second Edition,Elsevier, Reprinted ,2011.
- K.P. Soman- ShyamDiwakar and V. Ajay, *"Insight into Data mining Theory and Practice"*,Easter Economy Edition, Prentice Hall of India,2006.

Reference Books
- G. K. Gupta, *"Introduction to Data Mining with Case Studies",* Easter Economy Edition 2012.

PCAM311 OPERATING SYSTEM

Semester	: III	**Credit**	: 4
Category	: Core XII	**Hours/week**	: 5
Class &Major: II MCA		**Total Hours**	: 65

Objectives:
To enable the students
- Define the process and memory management in OS.
- Analyse the various algorithms in CPU Scheduling.
- Apply the scheduling algorithms to avoid deadlock in LINUX OS.

UNIT – I INTRODUCTION   10 Hrs
Definition of OS- Types of computer system- Computer system structures: I/O structure-Storage Structure – Operating System Structure: System Components – Services – System Calls – System programs – System Design and Implementation.

UNIT – II PROCESS MANAGEMENT   12 Hrs
Process Concepts–Process Scheduling–Operating on process–co-operating processes – Inter Process communications CPU scheduling – Multithreading Models – Threading issues – Overview - Multithreading Models.

UNIT – III CPU SCHEDULING AND PROCESS SYNCHRONIZATION   15 Hrs
Scheduling Concepts - Criteria–Scheduling algorithm–Multiple-processor scheduling-Real time scheduling–Algorithm Evaluation – Process synchronization: Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – System model.

UNIT – IV DEADLOCKS AND MEMORY MANAGEMENT   13 Hrs
Characterization–Deadlock characterization – Methods for handling deadlocks- Deadlock Prevention–Avoidance– Detection –Deadlock Recovery- Memory management: Swapping – Paging – Segmentation-Segmentation with paging- Demand paging–Page replacement– Thrashing.

UNIT – V FILE SYSTEM INTERFACE AND LINUX   15 Hrs

File Concept – Access Methods – Directory Structure - Allocation methods – Free-space management– Disk scheduling – Disk management – Swap-space management – RAID Structure- Linux: History- Design Principles – Kernel Modules – Process management – Scheduling – Memory Management- File systems – Security.

Text Book

- Silberschatz, Galvin and Gagne, *Operating System Concepts*, John Wiley & Sons Inc, Sixth Edition, 2003.

Unit I	: Chapter 1,2,3
Unit II	: Chapter 4,5
Unit III	: Chapter 6,7
Unit IV	: Chapter 8,9,10
Unit V	: Chapter 11, 12, 20

Reference Books

- Andrew S. Tanenbaum, Operating *system Design and Implementation,* PHI,2005.
  Milan Milankovic, *Operating System*, McGraw Hill,2003.
- H M Deital, P J Deital and D R Choffnes, *Operating Systems*, Pearson Education, 2004.
- Sumitabha Dos, *UNIX concepts and applications,* 4th edition, Mc-Graw Hill, 2006.

E-Resources
- http://www.w3schools.com/operatingsystem.html/
- https://www.youtube.com/watch?v=7r3Vln4bGLk
- https://www.youtube.com/watch?v=6TxXA3hbX8Y
- https://www.youtube.com/watch?v= y9C4EAqHxvI

PCAM315 COMPUTER NETWORKS

Semester	**: III**	**Credit**	**: 3**
Category	**: Core XIII**	**Hours/Week**	**: 4**
Class & Major	**: II MCA**	**Total Hours**	**: 52**

Objectives
To enable the students
- Understand the concepts of networking systems.
- Acquire the knowledge on various layers and its functions.
- Learn about Networking Protocols

UNIT - I INTRODUCTION TO NETWORKS   **11 Hrs**
Network hardware – Network software – Reference Models – Example Networks: Internet – X.25 – ATM Transmission media – Wireless Transmission – Telephone system – ISDN, ATM communication – Satellite communication.

UNIT - II PHYSICAL LAYER   **10 Hrs**

The Physical Layer: Guided Transmission Media – Wireless Transmission – Communication Satellites – The Public Switched Telephone Network.

UNIT - III DATA LINK LAYER   **11 Hrs**

The Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols.

UNIT - IV NETWORK LAYER   **10 Hrs**

The Network Layer: Network Layer Design Issues – Routing Algorithms – Congestion Control Algorithms – Quality of Service – Internetworking.

UNIT- V TRANSPORT LAYER   **10 Hrs**

The Transport Layer: The Transport Service (6.1.1,6.1.2,6.1.3) – The Application Layer: DNS – Domain Name System – Electronic Mail – The World Wide Web (7.3.1).

Text Books
- Andrew S. Tanenbaum, '*Computer Networks*', PHI, 5th Edition, 2013.

Reference Books
- Behrouz A. Forouzan, '*Data communication and Networking*', Tata McGrawHill, 4th Edition, 2006
- William Stallings, '*Data and Computer Communication*', 7th Edition, Pearson Education, 2007.

PCAM316 CLOUD COMPUTING

Semester   : III   **Credit**   : 4
Category   : Core XIV   **Hours/Week : 5**
Class & Major: II MCA   **Total Hours : 65**

Objectives
To enable the students
- Understand cloud computing techniques, best practices in cloud computing.
- Gain knowledge on the current challenges in cloud computing.
- Design and implement cloud-based applications.

UNIT - I UNDERSTANDING CLOUD COMPUTING   **10 Hrs**

Cloud Computing – History of Cloud Computing – Cloud Architecture – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services – Types of Cloud Service Development – Software as a Service – Platform as a Service – Infrastructure as a service-Database as a service.

UNIT - II CLOUD COMPUTING TECHNOLOGIES   **10 Hrs**

Hardware and Infrastructure: Clients – Security – Network – services – Accessing the Clouds: Platforms – WEB applications – WEB APIS – WB Browsers – Cloud Storage:

Overview – Storage provides – Cloud Standards: Applications – Client – Infrastructure – Services.

UNIT - III CLOUD COMPUTING APPLICATIONS   10 Hrs
Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT - IV VIRTUALIZATION & CLOUD SECURITY   10 Hrs
Virtualization characteristics – Managing virtualization – Virtualization in cloud – Virtualization desktop – Managing desktops in the cloud – Security issues – Storage basics – Storage as a service providers – security – aspects of data security – Data security mitigation – provider data and it's security.

UNIT - V USING CLOUD SERVICES   12 Hrs
Collaborating on Calendars – Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management –Collaborating on Project Management – Collaborating on Word Processing -Collaborating on Databases – Storing and Sharing Files.

Text Books

- Michael Miller, *'Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online'*, Que Publishing, 2008.
- Judith Hurwitz, Bloor Robin, Marcia Kaufman & Fern Halper, *'Cloud Computing for Dummies'* , Wiley India Edition, 2009.

Reference Books

- 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 Pty Limited, 2008.
- Anthony T Velte, Toby J Velte, Robert Elsenpeter, '*Cloud Computing a practical approach*', Tata McGraw-HILL,2010.

PCAR306/PCSR107 DATA MINING USING WEKATOOL -PRACTICAL

Semester   : I   **Credits   : 3**
Category   : Core Practical II   **Hours/Week : 4**
Class & Major : I MCA   **Total/Hours : 52**

Objectives
To enable the students
- Understand the concepts in Data mining.
- Apply programming skills in Weka tool.
- Analyze the dataset.

Lab Exercise

Create a Dataset with 'n' number of tuples for the following

1. Student Details
2. Super Market Details
3. Library Details
4. Employee Details
5. Recruitment Details
6. Patient Laboratory Details
7. Social Networking Reviews Details

To implement the Dataset in WekaTool
1. **Preprocessing on Dataset**
2. **Classification Rule Process of Dataset**
   a. J48 Algorithm
   b. ID3 Agorithm
   c. Naïve Bayes Algorithm
3. **Clustering Rule Process of Dataset**
   a. Simple k-means
4. **Association Rule Process on Dataset**
   a. APriori Algorithm
   b. FPgrowth Algorithm
5. **Data Visualiazation**

PCAR307   ADVANCED JAVA PROGRAMMING – PRACTICAL

Semester	**:III**	**Credit**	**: 2**
Category	**:Core Practical VI**	**Hours/Week**	**: 3**
Class & Major : II MCA		**Total Hours**	**: 39**

Objectives
To enable the students
- Develop Java Application and Applet program**.**
- Acquire practical knowledge on Advanced Java programming Concepts.
- Develop knowledge in the network programming on Java Bean, Servlets.

Lab Exercise

1. Overloading and Overriding.
2. Interfaces and Packages.
3. Exceptions handling mechanism.
4. Synchronization such as Thread based class
5. File operations.
6. Applets and AWT.
7. Servlet to display IP address and port number of a server
8. Servlet program using JDBC connection.
9. Servlet program to keep track previous request in session concept.
10. JSP page using Session Java Beans.

PCAM412 BIG DATA ANALYTICS

Semester	**:IV**	**Credit**	**: 4**
Category	**:Core XV**	**Hours/Week**	**: 4**
Class & Major :II MCA		**Total Hours**	**: 52**

Objectives
To enable the students
- Understand the importance of Big Data.
- Analyze the modern data analytical tools.
- Apply algorithm in various real-time applications.

UNIT - I INTRODUCTION TO BIG DATA   **10 Hrs**
       Introduction to Big Data – Characteristics of big data – Importance of Big data – Applications of Big Data Fraud Detection patterns – Risk patterns for modeling and Management – Big data and the Energy sector.

UNIT - II   DATA ANALYSIS   **10 Hrs**
       Introduction to Big Data Platform – Challenges of conventional systems – Web data – Evolution of Analytic scalability – Analytic processes and tools – Modern data analytic tools.

UNIT - III HADOOP   10 Hrs

Introduction to Hadoop – Components of Hadoop – Hadoop Architecture – Applications of Hadoop – Compression – Security – Enterprise integration in hadoop.

UNIT - IV STREAM COMPUTING   11Hrs

Introduction to Streams Concepts – Stream data model and architecture – Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Realtime Analytics Platform(RTAP) applications IBM Infosphere – Big data at rest – Infosphere streams – Data stage – Statistical analysis – Intelligent scheduler – Infosphere Streams.

UNIT - V FRAMEWORKS AND APPLICATIONS   11Hrs

IBM for Big Data – Map Reduce Framework – Hadoop – Hive – Sharding – NoSQL Databases – S3 – Hadoop Distributed file systems – Hbase – Impala – Analyzing big data with twitter – Big data for E-Commerce – Big data for blogs.

Text Books
- Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, '*Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data*', McGraw Hill, 2017.
- AnandRajaraman and Jeffrey David Ullman, '*Mining of Massive Datasets*', Cambridge University Press, 2012.

Reference Books
- Jay Liebowitz, '*Big Data and Business Analytics*', Auerbach Publications, CRC press 2013.
- EMC Education Services, '*Data Science and Big Data Analytics: Discovering, Analyzing,Visualizing and Presenting Data*', I edition, 2015.

PCAM413 SOFTWARE ENGINEERING

Semester   : V
Category   : Core XVI
Class & Major: II MCA

Credit   : 4
Hours/Week : 5
Total Hours   : 65

Objectives
To enable the students
- Understand the basic concepts of Software Engineering and the various phases in Software development.
- Understand User Conceptual Models and Interface Design
- Specification of participatory design and interactive debugging.

UNIT - I INTRODUCTION AND PROCESS MODEL   11 Hrs

Introduction to Software Engineering – Software – The changing nature of the software. A Generic view of Process – Software Engineering Layered Technology – A Process Framework – The Capability Maturity Model Integration – Personal AND Team Process Models. Process

Models – Waterfall – Incremental – Evolutionary – Specialized process models – Agile Process Models.

UNIT - II ANALYSIS MODEL   12 Hrs
Requirement Engineering – Initiating the Engineering Process – Eliciting requirements – Building Analysis Model – Data Modeling Concepts – Class Based Modeling Design Engineering – Design Concepts – Design Models – Architectural Design.

UNIT - III DESIGN MODEL   15 Hrs
Modeling Component – Level Design – Component – Designing Class – Based Components – Conducting Component – Level Design. Performing User Interface Design – Golden Rules – User Interface Analysis AND Design – Interface Analysis – Interface Design Steps – Design Evaluation.

UNIT - IV TESTING METHODS   15 Hrs
Testing Strategies – A Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional AND Object Oriented Software – Validation Testing – System Testing – The Art of Debugging Testing Tactics – Software Testing Fundamentals – Black Box and White Box Testing – Basis Path Testing – Control Structure Testing.

UNIT– V SOFTWARE QUALITY ASSURANCE   12 Hrs
Web Engineering – Attributes of Web– Based Systems and Applications – Web Application Engineering Layers – The Web Engineering Process – Web Engineering Best Practices. Quality Management – Quality Concepts – Software Quality Assurance – Software Reviews – Software Reliability.

Text Book
- Roger S. Pressman, '*A Practitioner's Approach Software Engineering',* Sixth Edition, McGraw Hill International Edition, 2009.

Reference Books
- Sommerville I, *Software Engineering*, 5th edition, Addison Wesley, 1996.
- David Gustafson, *Software Engineering*, Schaum's outlines, Tata McGraw – Hill, 2003.
- Waman S. Jawadekar. *Software Engineering: Principles and Practice,* McGraw Hill, 2004.

PCAM414 OPEN SOURCE TECHNOLOGY

Semester	: IV	**Credit**	: 4
Category	: Core XVII	**Hours/Week**	: 5
Class & Major	: II MCA	**Total Hours**	: 65

Objectives
To enable the students
- Understand the concept of Open Source Software.
- Acquire knowledge on PHP

- Develop programs using PHP and MySql

UNIT - I INTRODUCTION TO PHP   10 Hrs
Creating a Sample Application – Embedded PHP in HTML – Adding Dynamic Content – Accessing form variables – Identifiers - Variable types – Variable Scope. Operators – Precedence and Associativity – Variable functions. Making Decisions with Conditionals – Repeating actions through iteration – Breaking out of a Control Structure or Script.

UNIT - II ARRAYS   13 Hrs
Array – Array operators – Multidimensional Arrays – String Manipulation and Regular Expressions – Formatting Strings – Functions using substr() – Comparing Strings. Managing the Date and Time: Getting the date and Time from PHP – Converting between PHP and MySQL Date formats – Calculating Dates in PHP – Calculating Dates in MySQL.

UNIT - III FUNCTIONS   12 Hrs
Reusing code – require () and include() – require() for website templates. Functions in PHP: Calling Functions – Calling an undefined Function – Case and function names – Defining own functions – Examining Basic Function Structure – Parameters – Scope – Passing by reference versus Passing by value – return Keyword – Recursion.

UNIT- IV PHP and MySQL   15 Hrs
PHP Overview – Variables – Data Types – Functions - Array – Directory – File System – Simple XML – String - My SQL Database – MySQL in Web – Connect – Create – Insert – Select – Update – Delete – Web Concepts – Sessions – File Uploading.

UNIT- V XML AND JSON   15 Hrs
Introduction to XML and JSON – Strength and Limitations of XML and JSON – Applications of JSON – Characteristics of JSON – JSON Syntax – JSON Data Types – JSON Objects – JSON Schema – JSON Comparison with XML – JSON with PHP – JSON with PERL – JSON with Python.

Text Book
- Luke Welling, Laura Thomson, *PHP and MySQL Web Development*, Fourth Edition, Pearson Education, 2010

Reference Books
- Vikram Vaswani, *A Beginner's Guide PHP*, Tata Mcgraw Hill Education, 2007.
- Larry Ullman, *PHP 6 and MySQL 5*, Pearson Education, 2008.

e-Resources

- https://www.tutorialspoint.com/json/json_tutorial.pdf
- https://www.w3schools.com/js/js_json_intro.asp
- https://www.tutorialspoint.com/php/php_and_mysql.htm

PCAM410 WEB TECHNOLOGY

Semester : IV   **Credit** :4
Category : Core XVI   **Hours/Week** :5
Class &Major: II MCA   **Total Hours** :65

Objectives
To enable the students
- Understand the Dot.Net framework.
- Build applications using ASP.Net.
- Develop web applications and connect it to the database using ADO.NET.

UNIT –I C# PROGRAMMING   14 Hrs

The Philosophy of .NET: An Overview of .NET Assemblies - Understanding the Common Type System, Common Language Specification, Common Language Runtime - The Platform-Independent Nature of .NET - The System.Console Class - System Data Types and C# Keywords - Working with String Data - C# Iteration Constructs - Decision Constructs and the Relational/Equality Operators - Methods and Parameter Modifiers - C# Arrays, the enum Type, the Structure Type, Value Types and Reference Types, C# Nullable Types.

UNIT – II PILLAR OF OOP'S   15 Hrs

The first Pillar of OOP: Encapsulation - The Second Pillar of OOP: The Details of Inheritance - Programming for Containment/Delegation - The Third Pillar of OOP: C#'s Polymorphic Support - Understanding Base Class/Derived Class Casting Rules - The Master Parent Class: System.Object - Understanding Structured Exception Handling.

UNIT – III ADO.NET   16 Hrs

Definition of ADO.NET - ADO.NET Data Providers - ADO.NET Namespaces - Abstracting Data Providers Using Interfaces - Creating the AutoLot Database - The ADO.NET Data Provider Factory Model - the Connected Layer of ADO.NET - Working with Data Readers - Database Transactions - Disconnected Layer of ADO.NET - Role of the DataSet - Working with DataColumns, DataRows, DataTables & Data Adapters - The Entity Framework. Understanding the Role of Entity Framework-Building and Analyzing Your First EDM-Programming Against the Conceptual Model-AutoLotDAL Version Four, Now with Entities-Data Binding Entities to Windows Forms GUls-Going Forward with .NET Data-Access APls.

UNIT – IV ASP.NET   10 Hrs

Visual Studio – Designing a Web Page – Exploring the Anatomy of a web Form – Essentials of HTML – Writing Code – Debugging – Web Form Fundamentals – Web Controls – Error Handling, Logging and Tracking – State Management – Validation Controls – Rich Controls.

UNIT – V MASTER PAGES & THEMES   10 Hrs

User Controls and Graphics - Styles, Themes, and Master Pages - Website Navigation - ADO.NET Fundamentals - Data Binding - The Data Controls.

Text Books
- Andrew Troelsen, *Pro C# 5.0 and the .NET 4.5 Framework,* Sixth Edition, Apress, New York, 2012.
  - Unit I   : Chapter 1, 2, 3, 4
  - Unit II   : Chapter 5, 6, 7
  - Unit III   : Chapter 21, 22, 23
- Matthew MacDonald, *Beginning ASP.NET 4.5 in C#,* Apress, New York, 2012.

  - Unit IV   : Chapter 4, 5, 6, 7, 8, 9, 10
  - Unit V   : Chapter 11, 12, 13, 14, 15, 16

Reference Books
- *.NET 4.5 Programming 6-in-1, Black Book*, DreamTech Press Kogent solutions, 2012
- A.P.Rajshekhar,.*NET Framework 4.5 Expert Programming Cookbook*, Packt Publication, 2013

E-Resources
- http://www.w3schools.com/web.html/
- https://www.youtube.com/watch?v= bFdP3_TF7Ks
- https://www.youtube.com/watch?v= aoFDyt8oG0k

PCAM411 PRINCIPLES OF COMPILER DESIGN

Semester :IV	**Credit : 3**
Category :Core XVII	**Hours/Week :4**
Class &Major:II MCA	**Total Hours :52**

Objectives
To enable the students
- Study the principles of finite automata.
- Analyse the various algorithms in storage allocation techniques.
- Apply DFA and NFA in automata to produce the optimum results.

UNIT – I INTRODUCTION TO COMPILERS   **10 Hrs**
        Compilers – Analysis of source program – The Phases of compilers – Cousins of Compilers – The grouping of phases A simple one-pass compiler Overview – Syntax Definition – Syntax-directed translation – Parsing – Lexical analysis.

UNIT – II SYMBOL TABLE   **12 Hrs**
        The role of lexical analyzer – Finite Automata – DFA – Conversion of an NFA into a DFA – Conversion of an NFA to a Regular Expression - From a regular expression to an NFA – Design of a Lexical Analyzer Generator – Optimization of DFA – based pattern matchers.

UNIT - III SYNTAX ANALYSIS 10 Hrs

The role of a parser – Context Free Grammar – Top-down parsing – Bottom-up parsing – Operator – LR Parsers – Precedence parsing. Syntax-directed translation: Syntax – directed definitions – Construction of Syntax trees – Bottom-up evaluation of S-attributed definitions – Top-down translation – Recursive evaluators.

UNIT - IV TYPE CHECKING 10 Hrs

Type system – Specification of a simple Type Checker – Type conversions – An algorithm for unification. Run-time environments-Storage Organization-Storage -Allocation Strategies – Symbol Tables – Dynamic Storage allocation techniques.

UNIT –V INTERMEDIATE CODE GENERATION 10 Hrs

Intermediate languages – Declarations – Back patching – Procedure Calls. Code Generation: A simple code generator – the Dag representation of basic blocks – Peephole optimization – Code Generator generators. Code Optimization: Introduction – Principal sources of optimization – Optimization of basic blocks.

Text Book

- Alfred V.Aho, Ravi Sethi, Jeffery D.Ullman, *Compilers, Principles and Techniques and Tools*, Addison-Wesley, New Delhi, 1999.
    Unit I   : Chapter 1, 2
    Unit II   : Chapter 3
    Unit III   : Chapter 4, 5
    Unit IV   : Chapter 6, 7
    Unit V   : Chapter 8, 9, 10

Reference Books

- Chattopadhyay Santanu, *Compiler Design*, PHI, New Delhi, 2006.
- Holub Allen, *Compilers in C*, PHI, New Delhi, 1997.

E-Resources
- http://www.w3schools.com/compilers.html/
- https://www.youtube.com/watch?v= j3SCUBsZm4A
- https://www.youtube.com/watch?v=7r3Vln4bGLk

PCAR407   OPEN SOURCE TECHNOLOGY – PRACTICAL

Semester	**:IV**	**Credit**	**: 2**
Category	**:Core Practical VII**	**Hours/Week**	**: 3**
Class & Major:II MCA		**Total Hours**	**: 39**

Objectives:
To enable the students
- Write programs using Open Source Software
- Develop programs using PHP and MySql

Lab Exercise

1. Student Mark sheet using Operators and Decision making Statements.
2. Generate Multiplication Table using Iterations.
3. Implement Arrays.
4. Implement Functions.
5. String Operations.
6. Perform the Following Operations in MySQL.
    (i) Create Database (ii) Drop Database (iii) Select Database
7. Perform the Following Operations in MySQL.
    (i) Create Tables (ii) Drop Tables (iii) Insert Query.
8. Perform the Following Operations in MySQL.
    (i) Select Query (ii) Where Clause (iii) Update Query
9. Connect MySQL Database to Display the Details of Particular Student.
10. Create your own dynamic website using PHP and MySQL.

PCAR406 WEB TECHNOLOGY – PRACTICAL

Semester : IV	**Credit :2**
Category : Core Practical VIII	**Hours/Week :3**
Class &Major: II MCA	**Total Hours :39**

Objectives
To enable the students
- Acquire practical skills in C# programming and Server Side Scripting.
- Develop Web Applications using ADO.NET.

Lab Exercise

1. Programs to implement Encapsulation, Inheritance and Polymorphism.
2. Programs to implement Abstract Class using Inheritance.
3. Programs to implement File Handling and User Defined Exception.
4. Programs to implement String Handling
5. Developing Window Forms using C#
6. Using ADO.Net to handle data, Connecting to a database, firing queries to display Data
7. Online Banking System using .NET Controls
8. Online College Management System using Navigation Controls
9. Online Appointment Booking System
10. Data Controls

PCAE103 OPEN SOURCE PROGRAMMING

Semester : II	**Credit : 4**
Category : Non-Major Elective	**Hours/Week : 5P**
Class & Major: I PG	**Total Hours : 65**

Objectives
To enable the students

- Develop dynamic websites using PHP.
- Develop applications using MySQL and Python
- Understand Linux Shell Script.

Lab Exercises
1. Random number generation using Shell Script
2. Executing basic commands using Linux
3. Write a PHP programs to perform control and looping statements.
4. Write a PHP program to handle various String Functions.
5. Create a Home Page about the College using PHP
6. Write a PHP program to validate the form information (Name, Age, Phone No, Aadhar Number, Pincode Number)
7. Create a table in PHP with the required number of fields.
8. Develop simple application to connect with Database.
9. Write a PHP program using forms.
10. Execute DML and DDL commands.
11. Create students feedback form using PHP ad MySql
12. Develop an students mark sheet application using Python

III and IV EVALUATION COMPONENTS OF CIA

Semester	Category	Course Code	Course Title	Component III	Component IV
I	Core III	PCAM110	C Programming	Program Writing	Problem Solving
	Core IV	PCAM111	Web user interface design	Assignment	User Interface Modeling
	Core V	PCAM112	Computer organization and Architecture	Model Display	Problem Solving
	Core Practical I	PCAR105	C Programming –Practical	DPA	Viva-voce
	Core Practical II	PCAR106	Web user interface design-Practical	DPA	Viva-voce
II	Core V	PCAM205	Database Management System	ER Diagram	Writing Query
	Core VII	PCAM207	Object Oriented programming using C++	Program Writing	Problem Solving
	Core VIII	PCAM208	Data structures and algorithms	Assignment	Problem Solving
	Core Practical III	PCAR203	Database Management System-Practical	DPA	Viva-voce
	Core	PCAR204	Object Oriented Programming	DPA	Viva-voce

	Practical IV		using C++ -Practical		
III	Core X	PCAM313	Advanced Java Programming	Program Writing	App Development
	Core XI	PCAM314/ PCSM113	Data Mining	Assignment	Problem Solving
	Core XII	PCAM311	Operating System	Problem Solving	Seminar
	Core XIII	PCAM315	Computer Networks	Model	Seminar
	Core XIV	PCAM316	Cloud Computing	Working Model	Poster Presentation
	Core Practical V	PCAR306/ PCSR107	Data Mining using Weka Tool -Practical	DPA	Viva-voce
	Core Practical VI	PCAR307	Advanced Java Programming-Practical	DPA	Viva-voce
IV	Core XV	PCAM412	Big Data Analytics	Assignment	Report on real time usage of Big data
	Core XVI	PCAM413	Software Engineering	System Modeling	System Testing
	Core XVII	PCAM414	Open Source Technology	Program Writing t	App Development
	Core XVIII	PCAM410	Web Technology	Problem Solving	Web Designing
	Core XIX	PCAM411	Principles of Compiler Design	Problem Solving	Seminar
	Core Practical VII	PCAR407	Open Source Technology - Practical	DPA	Viva-voce
	Core Practical VIII	PCAR406	Web Technology -Practical	DPA	Viva-voce

NON – MAJOR ELECTIVES - PG

Semester	Category	Course Code	Course Title	Component III	Component IV
I	Non – Major Elective	PCAE103	Open Source Programming	DPA	Viva-Voce