Central University of Karnataka

ಕರ್ನಾಟಕ ಕೇಂದ್ರೀಯ ವಿಶ್ವವಿದ್ಯಾಲಯ

कर्नाटक केंद्रीय विश्वविद्यालय

M. C. A.

(Master of Computer Applications)

Register / Enrolment numbers: 20PGMCAOI

Programme Code: 20PGMCAOI

Course Structure and Syllabus

(With effect from 2020-21)

Department of Computer Science

School of Computer Science

Kadaganchi, Kalaburagi – 585 367, Karnataka State, India

MASTER OF COMPUTER APPLICATIONS (MCA)

(Effective from the academic year 2020-2021)
(For CBCS system in Central University of Karnataka, Kalaburagi)

DEPARTMENT OF COMPUTER SCIENCE

The Department of Computer Science established in 2012 in the School of Computer Science. Currently the Department of Computer Science offers Master of Computer Applications (MCA).

ELIGIBILITY FOR ADMISSION

Candidates who have completed undergraduate degree from a recognized Indian or foreign university (foreign recognition to be decided as per AIU foreign equivalence list) in any discipline and secured a minimum of 50% aggregate (45% in case of SC/ST candidates) marks and having studied Mathematics / Computer Science as a main / optional subject at 10+2 level or undergraduate level and who have secured a minimum of 40% (35% in case of SC/ST candidates) marks in the entrance test conducted by the university.

DURATION OF COURSE

The course shall be of two years duration spread over four semesters. The maximum duration to complete the course shall be 4 years.

MEDIUM OF INSTRUCTION

The medium of instruction shall be English.

PASSING AND CLASSIFICATION

The minimum marks for passing and classification for the award of the MCA Degree shall be as per the existing norms of other PG degree courses of Central University of Karnataka, Kalaburagi.

OTHER PROVISIONS

All the other provisions relating to attendance, reappearance in examinations, repeal and saving clauses, removal of difficulties, etc., shall be as per the existing norms of other PG degree courses of Central University of Karnataka, Kalaburagi.

Program Structure of Structure of MCA

MCA Semester I													
SL No	**In Sl No**	**Sub Code**	**T/P***	**Course Type**	**Course type**	**Title**	**Credits**	**duration**	**L+T+P+W+S***	**Duration of Exam (Min.)**	**IA (40 %)**	**End sem. Exam (60 %)**	**Total Marks**
1	1	PCATC10001	T	Core: 1	C	Computer Organization and Architecture	4	4	3+1+0=4	150	40	60	100
2	2	PCATC10002	T	Core: 2	C	Data Structure and Programming using C	4	4	3+1+0=4	150	40	60	100
3	3	PCATC10003	T	Core: 3	C	Operating System	4	4	3+1+0=4	150	40	60	100
4	4	PCATD10201	T	Discipline Specific Elective: I	D	Probability and Linear Algebra	4	4	3+1+0=4	150	40	60	100
5		PCATD10202				Accounting and Financial Management							
6		PCATD10203				Theory of Computation							
7		PCATD10204				System Software							
8		PCATD10205				Operations Research							
9		PCATD10206				Principles of Programming Languages							
10	5	PCATG10301	T	Generic Elective: I	G	Fundamentals of Computers	3	3	3+0+0=3	120	30	45	75
11		PCATG10302				Web Designing							
12		PCATG10303				ಗಣಕಯಂತ್ರದ ಮೂಲಭೂತ ಅಂಶಗಳು ಮತ್ತು ಕಚೇರಿ ಯಂತ್ರೀಕರಣ							
13	6	PCAPC10004	P	Practical	C	Based on PCATC10001 and PCATC10002	4	8	0+0+8=8	150	40	60	100
14	7	PCAPC10005	P	Practical	C	Based on PCATC10003 and PCATD10201 – 10206	4	8	0+0+8=8	150	40	60	100
							27	**35**					**675**

MCA Semester II													
SL No	**In Sl No**	**Sub Code**	**T=Theory P=Practical**	**Course Type**	**Course type**	**Title**	**Credits**	**duration**	**L+T+P+W+S*** **	**Duration of Exam (Min.)**	**IA (40 %)**	**End..sem. Exam (60 %)**	**Total Marks**
15	1	PCATC20006	T	Core: 4	C	Database Management System	4	4	3+1+0=4	150	40	60	100
16	2	PCATC20007	T	Core: 5	C	Object Oriented Programming	4	4	3+1+0=4	150	40	60	100
17	3	PCATC20008	T	Core: 6	C	Computer Graphics and Visualization	4	4	3+1+0=4	150	40	60	100
18	4	PCATD20207	T	Discipline Specific Elective: II (Through MOOC)**	D	Introduction to Computer Networks and Internet Protocols	3	3	3+0+0=3	120	30	45	75
19		PCATD20208				Fundamentals of Artificial Intelligence							
20		PCATD20209				Data Mining							
21		PCATD20210				Introduction to Internet of Things							
22		PCATD20211				Software Testing							
23	5	PCATG20304	T	Generic Elective: II	G	Introduction to Linux	3	3	3+0+0=3	120	30	45	75
24		PCATG20305				Python Programming							
25	6	PCAPC20009	P	Practical	C	Based on PCATC20006 and PCATC20007	4	8	0+0+8=8	150	40	60	100
26	7	PCAPC20010	P	Practical	C	Based on PCATC20008	2	4	0+0+4=4	75	20	30	50
27	8	PCAPC20011	P	Mini Project	C	Mini Project	3	6	0+0+6=6	120	30	45	75
							27	**36**					**675**

MCA Semester III													
SL No	**In Sl No**	**Sub Code**	**T/P***	**Course Type**	**Course type**	**Title**	**Credits**	**duration**	**L+T+P+W+S*** **	**Duration of Exam (Min.)**	**IA (40 %)**	**End sem. Exam (60 %)**	**Total Marks**
28	1	PCATC30012	T	Core: 7	C	Digital Image Processing	4	4	3+1+0=4	150	40	60	100
29	2	PCATC30013	T	Core: 8	C	Design and Analysis of Algorithms	4	4	3+1+0=4	150	40	60	100
30	3	PCATC30014	T	Core: 9	C	Software Engineering	4	4	3+1+0=4	150	40	60	100
31	4	PCATD30212	T	Discipline Specific Elective: III	D	ICTs in Healthcare	4	4	3+1+0=4	150	40	60	100
32		PCATD30213				ICTs in Agriculture							
33		PCATD30214				ICTs in Banking							
34		PCATD30215				GIS Applications							
35	5	PCATA30101	T	Ability Enhancement Compulsory Course	A	Neural Networks and Genetic Algorithms	4	4	3+1+0=4	150	40	60	100
36		PCATA30102				Fuzzy Sets and fuzzy logic							
37		PCATA30103				Pattern recognition							
38		PCATA30104				Natural language Processing							
39		PCATA30105				Machine Learning							
40	6	PCAPC30015	P	Practical	C	Lab based On PCATC30012 and PCATC30013	4	8	0+0+8=8	150	40	60	100
41	7	PCAPC30016	P	Practical	C	Lab based On PCATD30212 – 30215	2	4	0+0+4=4	75	20	30	50
42	8	PCAPC30017	P	Practical	C	Mini Project	3	6	0+0+6=6	120	30	45	75
							29	**38**					**725**

MCA Semester IV													
SL No	**In Sl No**	**Sub Code**	**Nature Course**	**Course Type**	**Course type**	**Title**	**Credits**	**duration**	**L+T+P+W+S*** **	**Duration of Exam (Min.)**	**IA (40%)**	**End.. sem. Exam (60 %)**	**Total Marks**
43	1	PCAIC40018	I	Internship	C	A: Internship * Project Seminar	2	4	0+0+4=4	--	0	50	50
44	2	PCARC40019	R	Dissertation	C	Internship * A: Dissertation / Targeted Project B: Dissertation/ Training and Evaluation	6	12	0+0+12=12	--	60	90	150
45	3	PCAPC40020	P	Practical	C	Project Viva voce	2	4	0+0+4=4	--	0	50	50
							10	**20**					**250**

* T-Theory, P-Practical, ** (or any course approved by the department), ***L-Lecture, T-Tutorial, P-Practical, W-Workshop, S-Seminar

Vision Statement:

To groom the students technically competent and skilled intellectual professionals to address the challenges in the current computing arena arising in Software Industry, Academia and Research & Development laboratories.

Mission Statements:

MS-1. Excellence in Teaching and Research.

MS-2. Build highly skilled IT professionals.

MS-3. Interaction with Industries and Research organizations.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Program Educational Objectives (PEOs)

1. Produce knowledgeable and skilled human resources which are employable in IT and ITES.
2. Impart knowledge required for planning, designing and building complex Application Software Systems as well as provide support to automated systems or applications.
3. Produce entrepreneurs who can develop customized solutions for small to large Enterprises.
4. To develop academically competent and professionally motivated personnel, equipped with objective, critical thinking, right moral and ethical values that compassionately foster the scientific temper with a sense of social responsibility.
5. To develop students to become globally competent.
    1. Mapping Program Educational Objectives (PEOs) with Mission Statements (MS)

	MS-1	MS-2	MS-3
PEO-1	1	3	2
PEO-2	1	2	2
PEO-3	1	3	3
PEO-4	3	2	2
PEO-5	2	3	1

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Program Outcomes (POs)

1. The understanding to apply knowledge of computing and technological advances appropriate to the Programme.
2. Skills to analyze a problem, and identify and define the logical modeling of solutions.
3. An ability to design, implement and evaluate a computer-based system, process, component, or Programme to meet stakeholder needs.
4. The ability to function effectively in teams to accomplish a common goal.
5. A sense of professional, ethical, legal, security and social issues and responsibilities.
6. Effectiveness in communicating with a wide range of audiences.
7. An ability to analyze the local and global impact of business solutions on individuals, organizations, and society.
8. An identification of the need to engage in continuing professional development.
9. An ability to provide solutions for research oriented problems.
10. Bridge the gap between industry and academia.
11. Mapping of Program Outcomes (POs) with Program Educational Objectives (PEOs)

	PEO-1	PEO-2	PEO-3	PEO-4	PEO-5
PO-1	3	2	3	1	2
PO-2	2	3	2	1	2
PO-3	1	1	2	3	3
PO-4	2	1	2	3	2
PO-5	1	1	1	3	3
PO-6	2	2	2	3	3
PO-7	2	2	3	2	1
PO-8	1	1	1	2	2
PO-9	2	2	1	2	2
PO-10	1	1	1	2	2

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATCC1101**, Title of the Course: **Computer Organization and Architecture**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold basic knowledge of Computers.
- The students should hold the skill set of basic Algebra.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Summarize the concepts of Number system, Boolean algebra and Logic gates. (Level 5: Evaluate)
CO-2: Experiment on Simplification of Boolean functions and Sequential Circuits. (Level 4: Analyze)
CO-3: Prepare an architectural logic and control design for the processor. (Level 3: Apply)
CO-4: Describe the basic concepts of microprocessors. (Level 2: Understand)
CO-5: Discuss the structure of memory and its components. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	2	3	2	2	--	3	1	2	--
CO2	3	3	2	--	--	--	2	1	1	--
CO3	3	2	2	--	--	--	3	--	2	2
CO4	3	1	2	--	--	--	2	--	1	--
CO5	2	1	2	2	--	1	1	--	--	--

PCATCC1101: Computer Organization and Architecture

Credits: 4 **IA: 40 Marks**

Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Number System: Introduction, Decimal, Binary, Octal, Hexadecimal, 1's and 2's Complements, Inter conversion of numbers, Codes: BCD Code, Character codes – ASCII, EBCDIC and Gray code. Binary Addition, Binary Subtraction, Signed Numbers, Addition /Subtraction of numbers in 2's compliment notation, Binary Multiplication, Binary division, Floating point representation of numbers, Arithmetic operations with normalized floating point numbers.

Boolean Algebra and Logic Gates: Introduction, Basic definition, Axiomatic Definition, Basic theorem and Properties of Boolean algebra, Minterms and Maxterms, Logic Operations, Digital logic gates, IC digital logic families.

Unit 2 **(15 hrs)**

Simplification of Boolean functions: Introduction, Different types of map method, product of sum simplification, NAND or NOR implementation, don't care condition, Tabulation method.

Combinational and Sequential Circuits: Introduction, Adders, Subtractors, Code conversion, Universal Gates, Multiplexer, De-Multiplexer, Flip-flops (SR, JK & D), Triggering of Flip–Flops, Design of counters and Design of state equations.

Unit 3 **(15 hrs)**

Processor Logic Design: Introduction, Processor Organization, Arithmetic Logic Unit, Design of Arithmetic and logic circuit, Status Register, Design of shifter, Processor Unit, Design of Accumulator.

Control Logic Design: Introduction, Control Organization, Hard-Wired Control, Micro-Program Control, Control of processor unit, PLA control, Micro program sequencer, Computer design.

Unit 4 **(15 hrs)**

Instruction and Addressing: Computer organization and Instruction set, Instruction formats, Addressing modes, Instruction cycle, Instruction execution in terms of micro instructions, Interrupt cycle, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks.

Memory System Design: Memory Origination, Memory Hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache Memory and Virtual Memory.

Reference Books:

1. M. Morris Mano (2007), *Computer System Architecture*, Prentice Hall.
2. William Stallings (2015), *COArchitecture Designing for Performance*, Pearson.
3. John P Hayes (1998), *Computer Architecture and Organization*, Tata McGraw Hill.
4. Bartee, T.C. (2001), *Digital Computer Fundamentals*, MC Graw Hill.
5. Mathur A.P. (1995), *Introduction to Microprocessors*, Tata Mc Graw Hill.

School of Computer Sciences
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Name of the Academic Program: Master of Computer Applications

Course Code: **PCATCC1102,** Title of the Course: **Data structure and Programming in C**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold fundamental knowledge of Computers.
- The students should hold the skill set of basic Mathematics.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Describe representation and functions of arrays. (Level 2: Understand)
CO-2: Analyze an algorithm for searching and sorting techniques in terms of time complexity (Level 4: Analyze)
CO-3: Use stacks, linear lists and queues. (Level 3: Apply)
CO-4: Describe the mathematical model for tree and graphs. (Level 4: Analyze)
CO-5: Demonstrate the data structure concepts using 'C' programming. (Level 3: Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	1	3	3	--	1	--	1	1	3	--
CO2	3	2	2	--	1	--	1	2	2	--
CO3	3	2	2	--	2	--	3	1	2	--
CO4	3	3	2	--	3	--	1	2	2	--
CO5	3	3	3	--	1	2	2	1	3	--

PCATCC1102: Data Structure and Programming using C

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15hrs)**

Introduction and Array: Definition of data structure, data structure operations. Linear arrays, Representation of linear arrays in memory, Address calculation of using row and column major ordering, Traversing linear arrays, Inserting and Deleting, Multidimensional arrays: Representation of Two-Dimensional arrays in memory.

Sorting & Searching: Introduction to Algorithm, Analysis of Time complexity of Selection, Bubble, Merge, Quick, Heap Sort, and Sequential Search & Binary Search.

Unit 2 **(15hrs)**

Stacks: Introduction, Array representation of stacks, Linked representation of stacks, Polish notation, Evaluation of a Postfix Expression, Transforming Infix Expressions into Postfix Expressions.

Linear List: 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 and Header linked lists.

Unit 3 **(15hrs)**

Queues: Definition, Array representation of Queues, Linked representation of Queues, Circular queues, Priority Queue and D-Queue.

Trees: Introduction and Definition of Trees, Tree Terminology, Binary Tree, Representing Binary Tree in Memory, Traversing Binary Tree: Preorder, In-order, Post-ordered traversal, Manipulation of Binary trees and Binary Search Tree.

Unit 4 **(15hrs)**

Graphs: Introduction, Graph theory terminology: Graph and multigraphs, Directed Graphs, Matrix representation of Graphs, Sequential representation of graphs: Adjacent matrix, traversing a graph: Breadth- First search, Depth First search and Spanning Tree.

Reference Books:

1. Seymour Lipchutz (1986), *Theory and Problems of Data Structures*, Tata Mc Grew.
2. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein (2005), *Data structure using C and C++,* II Edition, PHI Publications.
3. Jean – Paul Tembley and Paul G. Sorension (1983) *An Introduction to Data Structures with Applications*, II Edition, Tata Mc Graw Hill.
4. Srivastava S K (2011), *Data Structures Through C*, IInd Edition, BPB.
5. Reema Thareja (2015), *Introduction to C Programming*, IInd Edition, Oxford publication.

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Name of the Academic Program: Master of Computer Applications

Course Code: **PCATCC1103,** Title of the Course: **Operating System**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold basic knowledge of computer System.
- The students should have practical knowledge of working with computers.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Review the basic concepts of operating system. (Level 2: Understand)
CO-2: Illustrate the examples on processor scheduling and deadlock prevention. (Level 3: Apply)
CO-3: Justify the demand paging concepts for the comparison of page replacement algorithms. (Level 5: Evaluate)
CO-4: Describe the disk scheduling algorithms and its comparison in terms of performance. (Level 5: Evaluate)
CO-5: Review the file system and its protection mechanism. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	1	--	2	--	2	1	--	--	--
CO2	3	3	3	2	--	2	2	--	1	--
CO3	3	3	3	1	--	--	1	--	1	--
CO4	3	2	2	1	--	--	1	--	2	--
CO5	2	2	1	--	--	--	1	--	1	--

PCATCC1103: Operating System

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Introduction to Operating System: Operating systems concepts, types of operating systems, Evolution of operating systems, different views of the operating system, operating system services, System calls, Types of system calls, operating system structure, layered approach, Microkernels and Virtual machines.

Unit 2 **(15 hrs)**

Process Management: Process concept, operation on processes, Inter-process communication, mutual exclusion, process synchronization, Inter process synchronization, critical section problem, semaphores, process scheduling concepts, scheduling criteria, scheduling algorithms, deadlocks, system model, deadlock characterization, deadlock prevention, deadlock avoidance.

Unit 3 **(15 hrs)**

Memory Management: Introduction, memory management, swapping, contiguous memory allocation, paging, segmentation, virtual memory, demand paging, page replacement algorithms: FIFO, Optimal, LRU, Counting based page replacement.

Unit 4 **(15 hrs)**

Disk Scheduling: Introduction, physical characteristics, disk scheduling algorithms, disk Management, RAID Structure.

File system: Files, access method, directory structure, protection and file system implementation, allocation methods.

Protection: Goals, mechanism and policies, domain of protection, access matrix and its implementation, dynamic protection structure, revocation, security.

Reference Books:

1. J. Sliberschatz (2006), *Operating systems Concepts*, McGraw Hill.
2. Madnick, S.E. Donovan J.J. (1974), *Operating system*, McGraw Hill.
3. Brinch Hansen P (1973), *Operating system Principles*, PHI.
4. Milan Milenkovic (2001), *Operating systems*, McGraw Hill.
5. William Stallings (2018), *Operating system Internals and Design Principles,* Pearson.

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Name of the Academic Program: Master of Computer Applications

Course Code: **PCATDS1104,** Title of the Course: **Probability and Linear Algebra**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold basic skills of Statistics and Mathematics.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Explain the probability theory and its theorems. (Level 2: Understand)
CO-2: Compute the probability density function for the distributions (Level 3: Apply)
CO-3: Solve the real time problems using algebraic operations. (Level 3: Apply)
CO-4: Compute the Eigen value and Eigen vectors on real time requirements (Level 3: Apply)
CO-5: Discuss on matrix algebra and vector space (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	2	3	--	--	--	--	2	--	2	--
CO2	3	2	2	--	--	--	2	--	2	--
CO3	3	2	2	--	--	--	3	--	2	--
CO4	3	3	2	--	--	--	2	--	2	--
CO5	3	2	1	--	--	--	1	--	3	--

PCATDS1104: Probability and Linear Algebra

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Probability: Introduction to Probability Theory, Sample Spaces, Events, Axioms of Probability, Discrete Probability, addition and multiplication theorems on probability and compliments of events, conditional probability, Bayes Theorem.

Unit 2 **(15 hrs)**

Random Variables and Distribution: Introduction to Random variables, Probability density functions and distribution functions, Marginal density functions, Joint density functions, mathematical expectations, moments and moment generating functions. Discrete probability distributions: Binomial, Poisson distribution, Continuous probability distributions: Uniform distribution and Normal distribution.

Unit 3 **(15 hrs)**

Algebra: Fundamental operations in Algebra, expansion, quadratic equations, factorization, indices, logarithms, arithmetic, geometric and harmonic progressions, binomial theorem, permutations and combinations.

Unit 4 **(15 hrs)**

Matrix Algebra: Introduction to Elementary transformations, inverse of a matrix, rank, solution of simultaneous linear equations, eigenvalues and eigenvectors, quadratic forms.

Vectors: Vectors and geometry in two and three space dimensions, Dot products and the norm of a vector. Important inequalities, vector spaces, subspaces and vector space axioms, Complex vector spaces.

Reference Books:

1. Walpole, Myers Ye (2007), *Probability & Statistics for Engineers and Scientists*, Pearson Education.
2. T. Veerarajan (2002), *Probability, Statistics and Random Processes*, Tata McGraw – Hill.
3. Gilbert Strang (2016), *Introduction to Linear Algebra*, Wellesley-Cambridge Press.
4. David C. Lay, Steven R. Lay, Judi J. Macdonald, *Linear Algebra and Its Applications*, 5th Edition, Pearson.

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Name of the Academic Program: Master of Computer Applications

Course Code: **PCATDS1105,** Title of the Course: **Accounting and Financial Management**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold basic skills of operating computer.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Describe the principles of accounting. (Level 2: Understand)
CO-2: Apply costing concepts on real time problem. (Level 3: Apply)
CO-3: Estimate the concepts of Budget and inventory valuation system. (Level 2: Understand)
CO-4: Discuss on financial management policies. (Level 2: Understand)
CO-5: Summarize the accounting information system. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	1	2	2	--	--	--	3	--	1	--
CO2	2	3	1	--	--	--	3	--	1	--
CO3	2	3	2	--	--	--	2	--	1	--
CO4	1	2	2	--	--	--	2	--	2	--
CO5	3	2	2	--	--	--	2	--	1	--

PCATDS1105: Accounting and Financial Management

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Principals of accounting: Concepts of financial accounting, its functions and limitations, Assets and liabilities – owner's equity, Accounting records and systems, Control accounts and subsidiary ledgers, Preparations of income statement and balance sheet, Assets and working capital: Fixed assets, Sources working capital.

Analysis of Financial Statements: Objects, nature and types of analysis-Procedure for analysis, and interpretation- Ratio analysis, Analysis with fund flow and cash flow statements.

Unit 2 **(15 hrs)**

Introduction to Financial Management: Objectives, functions and scope of financial management, financial planning- formulation of financial policies, Capital structure planning- Factors influencing, capital structure theories.

Unit 3 **(15 hrs)**

Budgeting: Concepts of budgets and budgetary control, Characteristics of budgets: classification of budgets, Concept of capital budgeting methods pay back, average rate of return and discounted cash flow method and Cost of capital.

Inventory Valuation: Meaning, need, systems and methods of inventory valuation, inventory valuation for balance sheet.

Unit 4 **(15 hrs)**

Accounting Information System: Introduction to AIS, Application of general systems concepts to accounting, operational, planning and control, information requirements, database management systems, ERP, e-business and applications in accounting, analysis of computer controls, Case study on AIS.

Reference Books:

1. Khan & Jain (2007), *Financial Management*", Tata McGraw Hill.
2. J. Madegowda (2017), *Advanced Cost Accounting*, Himalaya Publishing.
3. Manmohan and Goyal (1975), *Principles of Management and Accounting*, IInd Edition, Sahitya Bahwan Publisher.
4. Maheshwari S. N (1996), *Advanced Accounting Vol. I and II*, Vikas Publishing Hopuse.
5. Sharma S. and Gupta (1996), *Financial Accounting for Management*, McMillan Publisher.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATDS1106,** Title of the Course: **Theory of Computation**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold knowledge of general computing and set theory.

Course Outcomes

After completion of this course successfully, the students will be able to

CO-1: Explain the concept of Automata theory and Turing machine. (Level 2: Understand)
CO-2: Apply regular expression on real time problem. (Level 3: Apply)
CO-3: Use Context-Free Grammars for the real time requirements. (Level 3: Apply)
CO-4: Discuss on Normal forms. (Level 2: Understand)
CO-5: Describe recursive enumerable approach for the real time problems. (Level 4: Evaluate)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	1	--	--	3	1	1	2
CO2	3	3	2	1	--	--	2	--	2	--
CO3	3	3	3	--	--	--	3	1	2	--
CO4	2	2	2	--	--	--	1	--	2	--
CO5	2	1	2	--	--	--	2	--	2	--

PCATDS1106: Theory of Computation

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Introduction to Finite Automata: Introduction to Finite Automata, the central concepts of Automata theory, deterministic finite automata, non-deterministic finite automata, equivalence NFA and DFA, Finite automata with Epsilon-transitions, conversion NFA with Epsilon-transitions to NFA, minimization of finite automata, finite automata with output, Moore and Melay machine.

Unit 2 **(10 hrs)**

Regular Expressions and Languages: Regular expression, equivalence Finite Automata and Regular Expressions, Closure properties of Regular languages, pumping lemma: proving languages not to be regular.

Unit 3 **(20 hrs)**

Context-Free Grammars and Languages: Type of grammar, Chomsky's hierarchy, derivation and its types, parsing, Parse trees, Ambiguity in grammars and removal techniques. Simplification of CFG: elimination of useless symbol, elimination of useless production, elimination of null production and unit production.

Properties of Context-Free Languages: Normal forms for CFG: CNF and GNF, The pumping lemma for CFLs, Closure properties of CFLs. Regular grammar, conversion right linear to left linear and left liner to right linear regular grammar, equivalence of regular gramma and finite automata.

Unit 4 **(15 hrs)**

Pushdown Automata: Definition of the Pushdown automata, the languages of a PDA, Instantaneous description, criteria of acceptance of the PDA, Equivalence of PDA's and CFG's, Non-deterministic Pushdown Automata.

Introduction to Turing Machines: Turing machine model, design of Turing machine as input out device, to compute function, language acceptor, problems that computer cannot solve, programming techniques for Turing Machines, extensions to the basic Turing Machine, restricted Turing Machines.

Reference Books:

1. J.P. Hopcroft, Rajeev Motwani, J.D. Ullman (2001), *Introduction to automata Theory, Languages and Computation*, IInd edition, Pearson Education.
2. Kamala Kirtivasan, Rama R (2009), *Introduction to Formal Languages, Automata Theory and Computation*, Pearson
3. H.R. Lewis, Shistor H, Papadimitroce (1999), *Elements of theory of Computation*, PHI
4. John Mastin (1998), *Introduction to Language and Theory of Computation*, TMH.
5. Rajesh K Shukla, Cengage (2009), *Theory of Computation*, Delmar Learning India Pvt. Ltd.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATDS1107,** Title of the Course: **System Software**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold knowledge of software and hardware.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO-1: Explain the concept of system software with real time examples. (Level 2: Understand)
CO-2: Use of Loader and Linker in software system. (Level 3: Apply)
CO-3: Describe the debugger architecture. (Level 2: Understand)
CO-4: Discuss on microprocessor functions. (Level 2: Understand)
CO-5: Distinguish between micro and macro processor. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**
CO1	2	2	2	--	2	--	--	--	2	--
CO2	2	2	1	--	--	--	--	--	1	--
CO3	1	2	2	--	--	--	1	--	1	--
CO4	2	2	2	--	--	--	2	--	1	--
CO5	1	2	2	--	--	--	1	--	2	--

PCATDS1107: System Software

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Introduction to system software: system programs, assembler, compiler, interpreter, operating system, Machine structure instruction set and addressing modes. Assemblers: basic assembler functions, machine dependent and machine independent assembler features, Assembler design two-pass assembler with overlay structure, one-pass assembler and multi-pass assembler.

Unit 2 **(15 hrs)**

Loaders and linkers: basic loader functions, machine dependent and machine independent loader features, loader design linkage editors, dynamic linking and bootstrap loaders.

Unit 3 **(15 hrs)**

Debuggers: Introduction, debugger architecture, H/W debugger facilities, OS debugger infrastructure, controlling execution, breakpoints and single stepping, inspecting data and variables, debugging GUI applications.

Unit 4 **(15 hrs)**

Microprocessors: basic microprocessor functions, machine independent features, macro processor design recursive, one-pass microprocessor, two-pass macro processor, general-purpose and macro processing with language translators.

Reference Books:

1. Leland L. Beck (1996), *System Software: Introduction to System Programming*, 3rd Edition, Addison Wesley.
2. Jonathan B. Rosenberg (1996), *How Debuggers Work: Algorithms, Data Structures, And Architecture*, 1st Edition, John Wiley & Sons.
3. Damdhare (1987), *Introduction to System Software*, McGraw Hill.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATDS1108,** Title of the Course: **Operations Research**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold basic knowledge of statistics.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Describe the principles of operation research. (Level 2: Understand)
CO-2: Apply LPP on real time requirements. (Level 3: Apply)
CO-3: Solve real time problems using Transportation and Assignment approach. (Level 3: Apply)
CO-4: Explain Game theory and queuing system. (Level 2: Understand)
CO-5: Discuss on network analysis techniques. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	2	2	2	--	--	--	1	--	2	2
CO2	2	3	2	--	1	--	2	1	2	--
CO3	3	2	2	--	1	--	2	--	3	1
CO4	3	3	2	2	1	1	1	--	3	--
CO5	1	2	2	--	1	--	1	--	2	--

PCATDS1108: Operations Research

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Introduction: Scope and applications, classification, General methods for solving OR models, Main phases of OR study, Linear Programming: formulation (both minimization and maximization), Solution – graphical and simplex method, General LPP, Basic solution and degenerate solution, Standard and canonical form of LPP and its characteristic features. Simplex algorithm and flowchart for maximization type problem.

Unit 2 **(15 hrs)**

Concept of duality: Formulation of dual LPP, Duality theorem, advantages of duality, dual simplex algorithm and sensitivity analysis, Transport Problem: Introduction, Formulation, Necessary and sufficient condition for the existence of feasible solution to a transportation problem, Initial basic feasible solution by NWCR, LCM and VAM, Optional solution using U V method, Algorithm and flow chart for minimization transportation problem.

Unit 3 **(15 hrs)**

Assignment Problem: Formulation, Optimal solution using Hungarian algorithm. Travelling sales man problem, Variations of the assignment problems.

Game Theory: Basic definitions, minmax–maxmin principle and optimal strategy, Solution of games with saddle point, dominance rule for solving a two person game.

Unit 4 **(15 hrs)**

Queuing Analysis: Introduction to stochastic process, Concept of queues, Markov chain model, Poisson process, birth and death process.

Network Analysis: Network and basic components, Rules for network construction, basic steps in PERT/CPM techniques and applications, time estimates and critical path in network analysis.

Reference Books:

1. Taha H.A (2017), *Operations Research: An Introduction*, 10th Edition, Pearson.
2. Billy E. Gilett, (1984), *Introduction to Operations Research*, McGraw-Hill.
3. Sharma (2009), *Operations Research: Theory and Applications*, Laxmi Publications.
4. Hillier F. S. (2017) *Introduction to Operations Research*, 10th Edition, McGraw-Hill.

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Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATDS1109,** Title of the Course: **Principles of Programming Languages**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should hold knowledge of computers.
- The students should know basics of programming.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO-1: Explain the basic principles of programming language. (Level 2: Understand)
CO-2: Give examples on sequence control construct for the real time requirements. (Level 2: Understand)
CO-3: Distinguish between Inheritance and Polymorphism. (Level 2: Understand)
CO-4: Review the best programming practices. (Level 2: Understand)
CO-5: Describe the sequence and parallel processing. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	2	--	1	--	2	1	1	1
CO2	2	3	2	--	1	--	2	--	1	--
CO3	2	3	3	1	1	--	1	--	2	--
CO4	3	3	3	--	--	--	2	--	2	2
CO5	2	1	2	--	--	--	1	--	2	--

PCATDS1109: Principles of Programming Languages

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Language design issues: Reasons for studying concepts of programming language, language evaluation criteria, influences on language design, structure and operation of computer, virtual computers, and language paradigms.

Data types: properties of types and objects, elementary data types, structured data types Abstraction: abstract data types, encapsulation by subprograms, type definition, storage management.

Unit 2 **(15 hrs)**

Sequence control: implicit and explicit sequence control, sequencing with arithmetic and non-arithmetic expressions, sequence control between statements, Subprograms control: subprogram sequence control attributes of data control, shared data in subprograms.

Unit 3 **(15 hrs)**

Inheritance and Polymorphism: Features of Inheritance and Polymorphism.

Language Translation issues: programming language syntax, stages in translation, formal translation models.

Unit 4 **(15 hrs)**

Advances in language design: variations on subprogram control, language constructors for parallel processing, language semantics, software architecture.

Reference Books:

1. Terrance W.Pratt, Marvin V Zelkowitz (2002), *Programming Languages, Design and Implementation*, PHI.
2. Ravi Sethi (1996), *Programming Language Concepts & Constructs*, Addison Welsey.
3. E. Horowitz (1984), *Fundamentals of Programming Languages*, Galgotia Publishers.
4. A. B. Tucker, Robert (2002), *Programming Languages*, McGraw Hill.
5. D. Apple J. J. Vandekopple (1997), *Programming Languages Paradigm and Practice*, McGraw Hill.

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Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATGE1110,** Title of the Course: **Fundamentals of Computer**
L-T-P: 2-1-0 Credits: 3
Prerequisite Course / Knowledge (If any):

- Students should have basic of electronics knowledge.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO-1: Describe the basics of computer and number system. (Level 2: Understand)
CO-2: Explain the network system and process of data. (Level 2: Understand)
CO-3: Discuss on features of windows operating system. (Level 2: Understand)
CO-4: Identify the services of internet and its applications. (Level 2: Understand)
CO-5: Discuss on types of Operating system. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	1	--	--	--	--	1	--
CO2	3	2	3	1	2	2	1	--	2	--
CO3	2	3	2	2	1	--	3	1	2	--
CO4	2	2	2	1	2	--	1	1	2	2
CO5	2	3	2	2	1	--	3	1	2	--

PCATGE1110: Fundamentals of Computers

Credits: 3 **IA: 30 Marks**
Contact Hrs (L:T:P): 3 (2:1:0) **End Exam: 45 Marks**

Unit 1 **(15 hrs)**

Basics of Computer: Definition, Characteristics of Computers, Applications of Computer, Generations of computers, Components of Computer System: Central Processing Unit (CPU), Input/output Devices, Computer Memory: primary and secondary memory, magnetic and optical storage devices, Concepts of Hardware and Software.

Number system: Binary Octal, Hexa-decimal, Number base conversion, Binary addition, Subtraction, One's and Two's compliment, Character codes – ASCII, EBCDIC.

Unit 2 **(15 hrs)**

Data processing: concepts of data processing, Definition of Information and data, Basic data types, Storage of data/Information as files, Representation of data/Information.

Network and Internet: History and evolution of Computer Network, Types of network (LAN, MAN & WAN), Search engines, Types of Search engines, Internet, architecture of internet, advantages and disadvantages of internet and its applications.

Unit 3 **(15 hrs)**

Operating system and Microsoft Windows: Definition & functions, basics of Windows, components of windows, icons, types of icons, taskbar, activating windows, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders, Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, windows accessories.

Reference Books:

1. P.B.Kottur (2009), *Computer Concepts & C Programming*, Sapna Book House.
2. V. Rajaraman (2008), *Computer Fundaments*, Prentice Hall of India.
3. P.K. Sinha (1992), *Computer Fundamental*, Prentice Hall of India.
4. Libreoffice Documentation Team (2019), *Getting Started with LibreOffice 6.0,* Lulu.com.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATGE1111** Title of the Course: **Web Designing**
L-T-P: 2-1-0 Credits: 3
Prerequisite Course / Knowledge (If any):

- The students should have basic knowledge of computers.
- The students should be well versed in operating the web sites.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO-1: Features for the Internet and World Wide Web. (Level 2: Understand)
CO-2: Apply HTML concepts on portal design. (Level 3: Apply)
CO-3: Apply CSS features on portal design. (Level 3: Apply)
CO-4: Practice the HTML and CSS features on real time requirements. (Level 3: Apply)
CO-5: Discuss CSS features. (Level 2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	1	2	--	2	2	2	1	2	2
CO2	2	3	3	--	--	2	2	--	1	2
CO3	2	3	3	--	--	2	2	--	--	--
CO4	2	2	3	--	--	2	1	--	2	--
CO5	2	3	3	--	--	2	2	--	--	--

PCATGE1111: Web Designing

Credits: 3 **IA: 30 Marks**
Contact Hrs (L:T:P): 3 (2:1:0) **End Exam: 45 Marks**

Unit 1 **(15 hrs)**

Introduction to Internet: Definition, History of the Internet, Internet Service Providers, Connection Types, Modems, DNS Servers, Internet connection using Dial-up Networking, Routers, Internet Addresses, Protocols of Internet

World Wide Web: Introduction, URL, web pages, web clients, web server, web Site Development, Web Content Authoring, Web Programming, Search Engines, Plug-ins, FTP Applications.

Unit 2 **(15 hrs)**

Basics of HTML: Introduction, History of HTML, Structure of HTML Document: Text Basics, HTML Elements, Attributes HTML Headings, Paragraphs, HTML Formatting, Fonts, Styles, Images, Multimedia, Lists, Links, Document Layout, Creating Forms, Frames and Tables, Introduction to DHTML, Advantages of DHTML.

Unit 3 **(15 hrs)**

Cascading Style Sheet: Properties: Using the style Attribute, Creating Classes and IDs, Generating External Style Sheets, Typography, Consistency, Types of styles, Specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Text and font attributes: changing fonts, text attributes, Advance CSS properties: Backgrounds, Box properties and Positioning.

Reference Books:

1. Satish Jain, Shashank Jain (2010), *Internet Technology and Web Design*, BPB Publication.
2. Thomas Powell (2017), *The Complete Reference: HTML & CSS*, 5th Edition, McGraw Hill.
3. Lemay Laura (2016), *Mastering HTML, CSS & Java Script*, BPB Publications.
4. Deborah J. Miller (2001), *Careers with Internet Service Providers*, Rosen Publishing Group.
5. Bryan Sullivan, Vincent Liu (2012), *Web Application Security, A Beginner's Guide*, McGraw Hill.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATGE1112,** Title of the Course: **ಗಣಕಯಂತ್ರದ ಮೂಲಭೂತ ಅಂಶಗಳು ಮತ್ತು ಕಚೇರಿ ಯಂತ್ರೀಕರಣ**

L-T-P: 2-1-0 Credits: 3

Prerequisite Course / Knowledge (If any):

- Students should have knowledge of operating computer.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Explain the basic concept of computer and internet. (Level 2: Understand)
CO-2: Illustrate the examples on Libreoffice features. (Level 3: Apply)
CO-3: Explain intranet features. (Level 2: Understand)
CO-4: Identify internet services. (Level 2: Understand)
CO-5: Describe types of internet. (Leve2: Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	1	1	--	1	1	--	1	--	--
CO2	2	2	3	--	--	--	2	1	--	1
CO3	1	2	2	--	--	1	--	--	--	--
CO4	2	2	1	--	--	2	1	--	--	2
Co5	1	2	2	--	--	1	--	--	--	--

PCATGE1112: ಗಣಕಯಂತ್ರದ ಮೂಲಭೂತ ಅಂಶಗಳು ಮತ್ತು ಕಚೇರಿ ಯಂತ್ರೀಕರಣ

ಕ್ರೆಡಿಟ್‌ಗಳು: 3 **ಐಎ: 30 ಅಂಕಗಳು**

ಗಂಟೆಗಳ ಸಂಪರ್ಕಿಸಿ (ಎಲ್: ಟಿ: ಪಿ): 3 (2: 1: 0) **ಅಂತಿಮ ಪರೀಕ್ಷೆ: 45 ಅಂಕಗಳು**

ಘಟಕ 1 **(15 ಗಂ)**

ಕಂಪ್ಯೂಟರ್ ಮತ್ತು ಇಂಟರ್ನೆಟ್: ಡೆಸ್ಕ್‌ಟಾಪ್ ಮತ್ತು ಲ್ಯಾಪ್‌ಟಾಪ್ ಕಂಪ್ಯೂಟರ್‌ಗಳ ಪರಿಚಯ, ಕಂಪ್ಯೂಟರ್ ಸಿಸ್ಟಮ್‌ನ ರಚನೆ, ಇನ್‌ಪುಟ್ ಮತ್ತು output ಟ್‌ಪುಟ್ ಸಾಧನಗಳು, ಮೆಮೊರಿ ಮತ್ತು ಶೇಖರಣಾ ಸಾಧನಗಳು, ವಿಭಿನ್ನ ಬಂದರುಗಳು ಮತ್ತು ಅದರ ಉಪಯೋಗಗಳು, ಮುದ್ರಕಗಳ ಪ್ರಕಾರಗಳು. ಸಾಫ್ಟ್‌ವೇರ್, ಸಿಸ್ಟಮ್ ಮತ್ತು ಅಪ್ಲಿಕೇಷನ್ ಸಾಫ್ಟ್‌ವೇರ್ ಪರಿಚಯ. ನೆಟ್‌ವರ್ಕಿಂಗ್, ವಿಭಿನ್ನ LAN ಮತ್ತು WAN ಸಂಪರ್ಕಗಳು, ನೆಟ್‌ವರ್ಕ್‌ಗೆ ಸಂಪರ್ಕ, ಪರೀಕ್ಷಾ ಸಂಪರ್ಕ, ಇಂಟರ್ನೆಟ್, ಐಪಿ ವಿಳಾಸ, ಹೈಪರ್‌ಟೆಕ್ಸ್ಟ್, ಏಕರೂಪದ ಸಂಪನ್ಮೂಲ ಲೊಕೇಟರ್, ವೆಬ್ ಬ್ರೌಸರ್‌ಗಳು, ಐಪಿ ವಿಳಾಸ, ಡೊಮೇನ್ ಹೆಸರು, ಇಂಟರ್ನೆಟ್ ಸೇವೆ ಒದಗಿಸುವವರು, ಇಂಟರ್ನೆಟ್ ಭದ್ರತೆ, ಇಂಟರ್ನೆಟ್ ಅವಶ್ಯಕತೆಗಳು, ವೆಬ್ ಸರ್ಚ್ ಎಂಜಿನ್, ಇಂಟರ್ನೆಟ್ ಸೇವೆಗಳು.

ಯುನಿಟ್ 2 **(15 ಗಂ)**

ಆಫೀಸ್ ಆಟೊಮೇಷನ್: ಪರಿಚಯ: ಬರಹಗಾರರ ಬಗ್ಗೆ, ದಾಖಲೆಗಳೊಂದಿಗೆ ಕೆಲಸ ಮಾಡುವುದು, ಪಠ್ಯದೊಂದಿಗೆ ಕೆಲಸ ಮಾಡುವುದು ಪಠ್ಯವನ್ನು ಫಾರ್ಮ್ಯಾಟಿಂಗ್ ಮಾಡುವುದು, ಪುಟಗಳನ್ನು ಫಾರ್ಮ್ಯಾಟ್ ಮಾಡುವುದು, ಡಾಕ್ಯುಮೆಂಟ್‌ಗೆ ಕಾಮೆಂಟ್‌ಗಳನ್ನು ಸೇರಿಸುವುದು, ವಿಷಯಗಳ ಕೋಷ್ಟಕವನ್ನು ರಚಿಸುವುದು, ಸೂಚ್ಯಂಕಗಳು ಮತ್ತು ಗ್ರಂಥಸೂಚಿಗಳನ್ನು ರಚಿಸುವುದು, ಗ್ರಾಫಿಕ್ಸ್‌ನೊಂದಿಗೆ ಕೆಲಸ ಮಾಡುವುದು, ಮುದ್ರಣ.

ಪರಿಚಯ: ಕ್ಯಾಲ್ಕ್, ಅಪ್ಲಿಕೇಶನ್‌ಗಳು, ಮುಖ್ಯ ವಿಂಡೋಗಳು, ಕಾಲಮ್‌ಗಳು ಮತ್ತು ಸಾಲುಗಳೊಂದಿಗೆ ಕೆಲಸ ಮಾಡುವುದು, ಡೇಟಾವನ್ನು ಫಾರ್ಮ್ಯಾಟ್ ಮಾಡುವುದು, ಸೂತ್ರಗಳು ಮತ್ತು ಕಾರ್ಯಗಳನ್ನು ಬಳಸುವುದು, ಪಿವೋಟ್ ಟೇಬಲ್‌ಗಳು ಮತ್ತು ಪಿವೋಟ್ ಚಾರ್ಟ್‌ಗಳು.

ಪರಿಚಯ: ಪ್ರಭಾವ, ಪ್ರಸ್ತುತಿಯನ್ನು ಫಾರ್ಮ್ಯಾಟ್ ಮಾಡುವುದು, ವಸ್ತುಗಳನ್ನು ಸೇರಿಸುವುದು, ಪಠ್ಯವನ್ನು ಸೇರಿಸುವುದು ಮತ್ತು ಫಾರ್ಮ್ಯಾಟ್ ಮಾಡುವುದು, ಸ್ಲೈಡ್ ಶೋ ಅನ್ನು ಹೊಂದಿಸುವುದು

ಯುನಿಟ್ 3 **(15 ಗಂ)**

ಅಂತರ್ಜಾಲ: ಅಂತರ್ಜಾಲ ಪರಿಕರಗಳು: ಇ-ಮೇಲ್: ಇ-ಮೇಲ್ನ ಅಂಗರಚನಾಶಾಸ್ತ್ರ, ಇ-ಮೇಲ್ ವಿಳಾಸ, ಇ-ಮೇಲ್ ವಿಳಾಸವನ್ನು ಕಂಡುಹಿಡಿಯುವುದು, ಸಹಿಯನ್ನು ಸೇರಿಸುವುದು, ಫೈಲ್‌ಗಳನ್ನು ಲಗತ್ತಿಸುವುದು, ಲಗತ್ತುಗಳನ್ನು ತೆರೆಯುವುದು, ಇ-ಮೇಲ್ ಖಾತೆಯನ್ನು ನಿರ್ವಹಿಸುವುದು, ಪ್ರಕರಣ ಅಧ್ಯಯನ: ಜಿಮೇಲ್ ಖಾತೆ, ಅಪ್‌ಲೋಡ್ ಮತ್ತು ಡೌನ್‌ಲೋಡ್ ಫೈಲ್‌ಗಳು, ಡಿಜಿಟಲ್ ಸಿಗ್ನೇಚರ್, ಆಂಟಿವೈರಸ್ ಸಾಫ್ಟ್‌ವೇರ್.

ಉಲ್ಲೇಖ ಪುಸ್ತಕಗಳು:

1. ಸುಸಾನ್ ಎಚ್. ಕೂಪರ್ಮನ್ (2008), ಪ್ರೊಫೆಷನಲ್ ಆಫೀಸ್ ಪ್ರೊಸೀಜರ್ಸ್, ಪಿಯರ್ಸನ್ ಪ್ರೆಂಟಿಸ್ ಹಾಲ್.
2. ಜೇಮ್ಸ್ ಎ. ಸೆನ್ (2004), ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ: ಪ್ರಿನ್ಸಿಪಲ್ಸ್, ಪ್ರಾಕ್ಟೀಸಸ್ ಅಂಡ್ ಆಪರ್ಚುನಿಟೀಸ್, ಪಿಯರ್ಸನ್ ಪ್ರೆಂಟಿಸ್ ಹಾಲ್.
3. ಪಂಕಜ್ ಶರ್ಮಾ (2004), ಇ-ಆಡಳಿತ, ಎಪಿಹೆಚ್ ಪಬ್ಲಿಷಿಂಗ್ ಕಾರ್ಪೊರೇಶನ್.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCAPCP1113,** Title of the Course: **Based on PCATCC1101 and PCATCC1102**
L-T-P: 0-0-8 Credits: 4
Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it.

the Academic Program: Master of Computer Applications

Course Code: **PCAPCP1114,** Title of the Course: **Based on PCATCC1103 and PCATDS1104 – 109**
L-T-P: 0-0-8 Credits: 4
Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATCC2115** Title of the Course: **Database Management System**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- Students should have the knowledge of data structures
- Students should know the concept of the file-handling

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO1: Identify the difference between database systems from file systems and describe each in both function and benefit. (Level 1 Remember)

CO2: Model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model. (Level 4 Analyze)

CO3: Describe the concept of normalization theory for normalizing database. (Level 2 Understand)

CO4: Explain the relational data model. (Level 2 Understand)

CO5: Apply practical experience by designing and constructing data models using SQL. (Level 3 Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	2	2	1	1	1	1	1	1	1
CO2	3	3	3	2	2	2	2	1	1	1
CO3	3	3	3	2	3	2	2	1	1	1
CO4	3	2	2	1	2	2	1	2	1	1
CO5	2	3	3	3	1	2	1	2	2	2

PCATCC2115: Database Management System

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Databases and Users: Introduction, File oriented approach, characteristics of Database approach, advantages of DBMS over File Processing System. Implications of database approach, when not to use a DBMS.

Database System Concepts and Architecture: Data Models, Schemas and Instances, DBMS Architecture and Data Independence- the Three Schema Architecture, Data Independence, DBMS languages and interfaces, The Database System Environment, Classification of DBMS.

Unit 2 **(15 hrs)**

ER-Model: Entity Types, entity sets, attributes and keys, Relationships, Relationship types, Roles and constraints, Weak entities, ER Diagrams Naming Conventions and Design Issues, ER Diagram for company Database, Case Studies: Insurance policy management system, Library Management system.

The Relational Data Model & Relational Constraints: Relational model concepts, Relational Constraints and Relational Database Schemas.

Relational Algebra Operation: Introduction, unary relational operation-select and project, Relation algebra operations from Set Theory-Union, intersection and minus operation, Cartesian product operation, Binary relational operations: Join and division, The Division operation.

Unit 3 **(15 hrs)**

SQL Schema Definition, Constraints, Queries and Views: SQL Data Definition and data types, specifying constraints in SQL, schema Change statement in SQL, basic queries in SQL, more complex SQL queries, INSERT, DELETE, AND UPDATE statements in SQL. Specifying constraints and assertions and triggers.

Functional Dependencies and Normalization of Relational Databases: Informal Design guidelines for Relation Schemas, functional dependencies, Normal Forms: 1NF, 2NF, 3NF AND BCNF, Multi valued Dependencies and fourth Normal Form, Join Dependencies and fifth Normal form.

Unit 4 **(15 hrs)**

Introduction to Transaction Processing Concepts and Theories: Introduction to transaction processing, transaction and system concepts, Desirable properties of transaction, characterizing schedules based on recoverability, and characterizing schedules based on serializability.

Concurrency Control Techniques: Lock based concurrency control, Deadlocks, implementation of locking, Multiversion concurrency control techniques, and validation concurrency control Techniques.

Database Recovery Techniques: Recovery concepts, recovery techniques based on Deferred update. Database security: Introduction to database security, discretionary access control, mandatory access control, and statistical database.

Reference Books:

1. Elmasri R and Navathe SB (2007), *Fundamentals of Database Systems*, 5th Edition, Pearson Education.
2. Connolly T, Begg C and Strachan A (1999), *Database Systems*, 2nd Edition, Addison Wesley.
3. Abrahamsi. Silberschatz, Henry. F. Korth, S. Sudarshan (2012), *Database System* Concepts, 6th Edition, McGraw Hill.
4. Silversatz, H. Korth and S. Sudarsan (2005), *Database Cocepts,* 5th Edition, Mc-Graw Hills.
5. C.J. Date (2003), *Introduction to database systems*, 8th Edition, Addison Wesley.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCATCC2116** Title of the Course: **Object Oriented Programming**
L-T-P =3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- Students should have the knowledge of procedure oriented programming.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Distinguish between object oriented paradigm and the procedure oriented paradigm.. (Level 2 Understand)
CO-2: Explain the basic principles of object-oriented design. (Level 2 Understand)
CO-3: Write Java application programs using OOP principles and proper program structuring. (Level 3 Apply)
CO-4: Create packages and interfaces. (Level 6 Create)
CO-5: Apply practical experience gained in designing and constructing data models using java programming. (Level 3 Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	2	3	3	1	1	2	2	2	1
CO2	3	1	3	2	1	1	2	1	2	2
CO3	3	3	2	3	1	1	2	2	2	1
CO4	3	2	2	2	2	3	3	3	2	2
CO5	3	2	2	3	1	3	2	3	3	3

PCATCC2116: Object Oriented Programming

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

Fundamentals of Object Oriented Programming: Basic Concepts of Object Oriented Programming, Benefits and Applications of OOP, Comparison of Object Oriented Programming Languages.

The Genesis of Java: The Java Buzzwords, Java's lineage (Needs of C and C++ and its Comparison with java), Basic Data Types Of Java and Simple programs, Command line Arguments, Why java is Important to the Internet, Java's Magic:-The Byte code.

Arrays, Strings and Vectors: Declaration, Creation and operations on One and Two-Dimensional Arrays. The String Classes and its commonly used methods, Vectors and Wrapper Classes.

Unit 2 **(15 hrs)**

Introducing Classes and Objects: Class Fundamentals, Declaring Object, Assigning object reference variables, Static variables and Static Methods. Constructors-Its Characteristics and Features, Overloaded Constructors and the 'this' keyword.

Inheritance: Inheritance Basics, Concepts of Sub-class and Super-class. Constructing a Sub-class with the use of the keywords extends, super and final. Method Overriding and Access Modifiers.

Interfaces and Packages: Interfaces- Their Use in Multiple inheritance, Defining and implementing interfaces with examples. Packages- Java API Packages, Use of Import Statements and Package Creation, Defining and implementing packages with examples.

Unit 3 **(15 hrs)**

Exception Handling: Fundamentals, Exception Types, Using try and catch blocks. Multiple catch clauses, Use of throw, throws and finally. Java Built-in Exceptions and Creating Own-Exception sub-classes.

Multi-threaded Programming: Concept of Parallel and Multitasking, Creating Thread, Creating Multiple Threads, Thread Priorities and Synchronization.

Unit 4 **(15 hrs)**

Applet Class: Fundamentals of Applets, Creations and Execution. Methods of applet. The HTML applet Tag, Passing parameters to applets.

Introducing the AWT: AWT Classes Windows Fundamentals, Working with Graphics and Setting fonts and colors.

Using AWT Controls: Event Handling-The Delegation Event Model, Event Classes and Event Listener interfaces. Form Elements- Labels, Text-Fields, Buttons, Checkboxes, Checkbox Group, Choice, List and Scrollbars. Their associated Methods and events.

Reference Books:

1. E. Balaguruswamy, *Programming with Java*, A primer, 4th Edition, Tata McGraw-Hill Publications.
2. Steven Holzner (2000), *Java Programming*, BPB Publications.
3. Paul Deital & Harvey Deital (2015), *Java: How to Program*, 10th Edition, Pearson Education.
4. Robert Lafore (2002), *Object Oriented Programming in C++*, 4th Edition, Galgotia publications.
5. Herbert Schildt (2002), *JavaTM2 the Complete Reference*, 5th Edition,Tata McGraw-Hill.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications (MCA)

Course Code: **PCATCC2117** Title of the Course: **Computer Graphics and Visualization**
L-T-P: 3-1-0 Credits: 4
Prerequisite Course / Knowledge (If any):

- The students should have the basic knowledge of computers and programming.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to

CO-1: Describe the basic display devices and input devices. (Level 2 Understand)
CO-2: Explain drawing algorithms for line, circle, ellipse etc. 2D transformations, line and polygon clipping, color fill methods, and 2D projections. (Level 2 Understand)
CO-3: Explain 2- dimensional graphical objects using geometrical algorithms and performs operations on them. (Level 2 Understand)
CO-4: Employ the introduction of Fractal Graphics. (Level 3 Apply)
CO-5: Experiment the Computer Graphics algorithms using OpenGL. (Level 4 Analyze)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	2	2	1	1	1	1	2	2	1	1
CO2	3	2	3	3	2	2	1	1	2	2
CO3	3	3	2	2	3	2	2	2	3	3
CO4	2	2	3	3	2	1	1	3	3	3
CO5	3	3	2	2	2	1	2	3	3	3

PCATCC2117: Computer Graphics and Visualization

Credits: 4 **IA: 40 Marks**
Contact Hrs (L:T:P): 4 (3:1:0) **End Exam: 60 Marks**

Unit 1 **(15 hrs)**

A Survey of Computer Graphics, Overview of Graphics systems: Video Display Devices, Raster-Scan System, Random-Scan Systems, Graphics Monitors and Workstations, Input Devices, Graphics Software.

Unit 2 **(15 hrs)**

Points and Lines, Line-Drawing Algorithms, Circle-Generating Algorithms, Ellipse-Generating Algorithms, Parallel Curve Algorithms, Pixel Addressing, Filled-Area Primitives, Line Attributes, Curve Attributes, Colour and Grayscale Levels, Area-Fill Attributes.

Unit 3 **(15 hrs)**

Line Drawing Methods, Two-Dimensional Transformation: Mathematical treatment of basic transformation such as translation scaling and rotation. Development of composite transformation matrices using homogeneous coordinates. General fixed point scaling and pivot point rotation. Clipping: Study of Cohen Sutherland line clipping procedure and Sutherland Hodgmen polygon clipping procedure. Windows and Viewports: Derivation of generalized window to viewport transformation matrix. Three-Dimensional Computer Graphics: Introduction to left and right hand coordinate systems. Basic 3D-transformation. Hidden line removal. **Projection:** Study of orthographic and oblique parallel transformation equations for them.

Unit 4 **(15 hrs)**

Colour Models and Colour Applications: Intuitive Colour Concepts, RGB Colour Model, YIQ Colour Model, Conversion Between HSV and RGB Models, Colour Selection and Applications, Computer Animation, Design of Animation Sequences, General Computer-Animation Functions, Raster Animations, Computer-Animation Languages, Key-Frame Systems, Morphing, Simulating Accelerations, Motion Specifications, Direct Motion Specification.

Reference Books:

1. Hearn Donald, Pauling Baker. M (1998), *Computer Graphics*, IEEE PHI.
2. Newman and Sproull (1996), *Principles of Interactive Computer Graphics*, McGraw Hill.
3. S. Harrington (1997), *Computer Graphics*, McGraw Hill.
4. Donald Hearn, M. Pauline Baker (2014), *Computer Graphics C Version*, Pearson Education.
5. Peter Shirley, Michael Ashikhmin (2009), *Fundamentals of Computer Graphics*, 3rd Edition, A K Peters/CRC Press.
6. Philip J Schneider, David H Eberly, *Geometric Tools for Computer Graphics.*

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications (MCA)

Course Code: **PCATGE2123** Title of the Course: **Introduction to Linux**
L-T-P=2-1-0 Credits: 3
Prerequisite Course / Knowledge (If any):

- Students should have basic knowledge of computer hardware and software.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO-1 Discuss on free and open source software. (Level 2 Understand)
CO-2 Discuss the role of Kernel and shell. (Level 2 Understand)
CO-3 Demonstrate different commands in Linux. (Level 3 Apply)
CO-4 Describe the shell variables and shell scripting. (Level 2 Understand)
CO-5 Explain the Linux networking and communication. (Level 2 Understand)

Mapping of Course Outcomes (COs) with Program Outcomes (Pos)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	1	1	1	1	2	2	2
CO2	3	3	3	1	1	1	1	2	2	2
CO3	3	2	3	1	1	1	2	2	3	3
CO4	3	2	3	1	1	1	2	2	3	3
CO5	3	3	2	2	1	1	2	2	2	2

PCATGE2123: Introduction to Linux

Credits: 3 **IA: 30 Marks**
Contact Hrs (L:T:P): 3 (2:1:0) **End Exam: 45 Marks**

Unit 1 **(15 hrs)**

Linux Introduction: Linux Distributions, Operating Systems, History of Linux, Linux Vs. Windows, Architecture of Linux, Advantages and disadvantages of Linux, File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, Searching a file & directory, zipping and unzipping concepts, Linux Editing: Overview of vi, vi Commands, Linux Shell Scripting.

Unit 2 **(15 hrs)**

Linux Networking: Introduction to Networking in Linux, Network basics & tools, File transfer protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

Unit 3 **(15 hrs)**

Linux Communication: Connecting to the world, secure communication ssh and vpn, File transfer, Linux – Environment Variables, Communication in Linux, Managing Processes in Linux.

Reference Books:

1. Richard Petersen (2007), *Linux: The Complete Reference*, 6th Edition. McGraw Hill
2. Machtelt Garrels, (2008) *Introduction to Linux, A Hands on Guide, Unix academy*
3. Richard Blum, (2015), *Linux Command Line and Shell Scripting Bible*, 3rd Edition.
4. Jason Cannon, (2002) *Linux for Beginners: An Introduction to the Linux Operating System and Command Line*.
5. Christine Bresnahan and Richard Blum, (2015), *Linux Essentials*, 2nd Edition.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications (MCA)

Course Code: **PCATGE2124** Title of the Course: **Python Programming**
L-T-P: 2-1-0 Credits: 3
Prerequisite Course / Knowledge (If any):

- Student should have knowledge of computers and programming.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO-1 Explain the fundamentals of python programming. (Level 2 Understand)
CO-2 Explain the basic principles of functions and modules. (Level 2 Understand)
CO-3 Describe file handling and exception handling. (Level 2 Understand)
CO-4 Identify and fix common errors in Python programs. (Level 4 Analyze)
CO-5 Write codes in Python to solve mathematical or real world problems. (Level 3 Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	2	2	1	1	2	2
CO2	3	2	2	3	2	2	2	2	3	3
CO3	3	3	3	2	2	2	1	3	3	3
CO4	3	2	2	3	1	1	1	2	2	2
CO5	3	3	3	2	2	2	1	3	3	3

PCATGE2124: Python Programming

Credits: 3 **IA: 30 Marks**
Contact Hrs (L:T:P): 3 (2:1:0) **End Exam: 45 Marks**

Unit 1 **(15 hrs)**

Introduction to Python Language: History of Python, What is Python mainly used for?, Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions.

The Context of Software Development: Software, Learning Programming with Python. Values and Variables-Integer and String Values-Identifiers-User Input-String Formatting, String Values, String Operations, String Slices, String Operators,

Unit2 **(15 hrs)**

Data Collections and Language Component: Numeric Data Types, Conversions, Built-in Functions, Expressions and Arithmetic- Expressions, Arithmetic Examples.

Control Flow and Syntax: Indenting, if Statement, If Else Statement, elif Statement, For Loops While Loops, While True Loops.

Unit3 **(15 hrs)**

Functions and Modules: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Functions - "First Class Citizens", Passing Functions to a Function.

Objects and Classes: Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods.

Reference Books:

1. Charles Dierbach (2015), *Introduction to Computer Science using Python*, Wiley,1st Edition ISBN-10: 81265560132015
2. John Zelle (2010), *Python Programming: An Introduction to Computer Science*, 2nd Edition.
3. Zed A.Shaw (2017), Learn Python the Hard Way Paperback, Pearson Education, 3rd Edition ISBN-10: 9332582106.
4. Felix Alvaro, *PYTHON*, Easy Python Programming for Beginners, Your Step-By-Step Guide to Learning Python Programming.
5. Paul Barry *(2010), Head First Python,* O' Reilly Publishers, 1st Edition, ISBN: 1449382673.

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCAPCP2125** Title of the Course: **Practical Based on PCATCC2115 and PCATCC2116**
L-T-P: 0-0-8 Credits: 4

Laboratory assignment shall be carried out to include the features studied in PCATCC2115 (Database Management System) and PCATCC2116 (Object Oriented Programming).

School of Computer Sciences
Department of Computer Science

Name of the Academic Program: Master of Computer Applications

Course Code: **PCAPCP2126** Title of the Course: **Based on PCATCC2117 and Mini Project**
L-T-P: 0-0-8 Credits: 4
Prerequisite Course / Knowledge (If any):

- Students should have knowledge of programming language and software engineering.

Course Outcomes (COs)

After completion of this course successfully, the students will be able to
CO1: Understand the concept of software and its development process (Level 2 Understand)
CO2: Apply the studied algorithms for the development of software. (Level 3 Apply)
CO3: Develop the software modules as per the software specifications. (Level 6 Create)
CO4: Design and implement the data model and create the required database. (Level 6 Create)
CO5: Sketch the data flow for the mini-project (Level 3 Apply)

Mapping of Course Outcomes (COs) with Program Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	2	2	1	1	2	3
CO2	2	3	2	3	2	2	2	2	3	3
CO3	3	3	3	2	2	2	1	3	3	3
CO4	3	3	2	3	1	1	2	2	2	2
CO5	3	3	3	2	2	2	2	3	3	3

Mini Project

Project work will be carried out either in the department. Each student shall carry out the project work individually/group (Max two members) and present the work done in the seminar conducted in the department. The students are required to submit a soft copy of the project report based on the work done by him/her during the project period. The project topics should be approved from the departmental panel. Students must submit a synopsis separately of more than one topic.

Synopsis Template

The write up must adhere to the guidelines and may include the following:

- Name / Title of the Project
- Introduction and Review
- Requirements (Hardware and Software)
- Objective and scope of the Project

- Methodology
- Results
- Applications
- Conclusions

Guidelines for preparing the project Report:

As per the Latex template provided by the department.

Submission of Project Report:

Soft copy of the roject report shall be submitted through the Moodle LMS course link provided by the internal project guide.

Chairman

BoS in Computer Science