MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624 102

MCA

(Two – Years)

(EFFECTIVE FROM JUNE 2020-2021 ONWARDS)

Master of Computer Applications (MCA)

About MCA

Master of Computer Applications (MCA) is a two year professional post-graduate programme for candidates wanting to delve deeper into the world of computer application development. The programme is a blend of both theoretical and practical knowledge. The course objective of MCA is to provide a steady stream of necessary knowledge, skills and foundation needed to meet out the rewarding career requirements in this growing world of Information Technology.

The idea behind offering MCA programme is to equip students with the latest tools, technologies, and applications in IT to make them stand out from the crowd in the IT industry. Ultimately the Masters in Computer Application is a senior level course that prepares professionals to meet the complex demands of the IT industry. Curricula would focus on learning aspect from various dimensions; Conceptual Learning, Skills based Learning and Practical / Hands exposure

A candidate with a master's degree in computer applications along with the relevant work experience, skill set and caliber can easily find great job opportunities at leading IT industries (both private and government) across India and abroad. As a positive impact of this programme, the students would inherit the ability to practice and develop softwares for interpretation and analysis of data and to use the concepts, techniques, skills, and modern Software tools necessary for software Development for various applications.

MCA 2 Years

S.No	SUBJECT	Distribution of Hours				Total Credits
I Year		**L**	**T**	**P**	**Total Hours**	
Semester I						
PCA20T11	C++ & Data Structures	3	1	0	4	4
PCA20T12	Mathematical Foundation for Computer Science	3	1	0	4	4
PCA20T13	Operating System	3	1	0	4	4
PCA20T14	Digital Principles and Computer Organization	3	1	0	4	4
PCA20E15	Elective – I	3	1	0	4	4
PCA20P16	Data Structures using C++ Lab	0	0	5	5	3
PCA20P17	R Programming Lab	0	0	5	5	3
					30	**26**
Semester II						
PCA20T21	Programming in JAVA	3	1	0	4	4
PCA20T22	Software Engineering	3	1	0	4	4
PCA20T23	Database Management System	3	1	0	4	4
PCA20T24	Computer Networks	3	1	0	4	4
PCA20E25	Elective – II	3	1	0	4	4
PCA20P26	Java Programming Lab	0	0	5	5	3
PCA20P27	DBMS Lab	0	0	5	5	2
PCA20P28	Mini Project	0	0	0	0	1
					30	**26**
II Year						
Semester III						
PCA20T31	Web Technology	3	1	0	4	4
PCA20T32	Data Mining	3	1	0	4	4
PCA20T33	Machine Learning Techniques	3	1	0	4	4
PCA20T34	Digital Image Processing	3	1	0	4	4
PCA20E35	Elective – III	3	1	0	4	4
PCA20P36	Web Technology Lab	0	0	5	5	3
PCA20P37	Python Programming Lab	0	0	5	5	3
					30	**26**

Semester IV						
PCA20P41	Major Project	0	0	24	24	12
T o t a l C r e d I t s		**9 0**				

MOOC Courses with Extra Credits:

PCA20MC1	MOOC Course - I	0	0	0	0	1
PCA20MC2	MOOC Course – II	0	0	0	0	1

E l e c t I v e I P a p e r s

D e s I g n and Analysis of Algorithms

1. Multimedia Systems
2. Open Source Technology
3. Microprocessor & Assembly Language Programming
4. Network Security

Elective II Papers

1. Resource Management Techniques(Operation Research)
2. Artificial Intelligence
3. Bigdata Analytics
4. Object Oriented Analysis and Design
5. Cloud Computing

Elective III Papers

1. Soft Computing
2. Deep Learning Techniques
3. Internet of Things
4. Mobile Computing
5. Python Programming

PROGRAMME OUTCOMES (POs)

1. Identify and analyze the computing requirements of a problem and to solve those using computing principles.
2. Understand and Apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.
3. Use suitable architecture or platform on design and implementation with respect to performance.
4. Apply the management principles with computing knowledge to manage the projects in multidisciplinary environments.
5. Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
6. Expertise in developing application with required domain knowledge

PROGRAMME SPECIFIC OUTCOMES

PSO1: Understand the Opportunities and Challenges in Industry and to equip the students accordingly

PSO2: Apply effectively the principles and methods of Computer Technology to a wide range of applications.

PSO3: Apply advanced algorithmic and mathematical concepts to the design and analysis of software.

PSO4: Get proficiency of computing, and to prepare themselves for a continued professional development.

SEMESTER I

PCA20T11	**C++ & DATA STRUCTURES**		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyse		
Objectives	1. To learn the syntax and semantics of the C++ programming language. 2. To provide an insight into inheritance, virtual functions, polymorphism and Exception Handling. 3. To implement dynamic binding and Exception Handling mechanisms. 4. To be familiar with linear and non-linear data structures concept		

UNIT-I

Introduction to Object Oriented Programming – C++ comments – Classes: some difference between C and C ++ - introducing function Overloading- constructor and Destructor function – constructors take parameters – introducing inheritance – Object pointers – in line functions – Automatic in line

UNIT-II

Assigning Object – passing Object to function – returning Object from Functions – an introduction to friend – arrays of objects – using pointers to objects – using new and delete – references – passing references to object – returning references – independent references and restrictions

UNIT-III

Overloading constructor functions – creating and using a copy constructor – using default arguments – Overloading and ambiguity –finding the address of an overloading function –overloading binary operators – overloading the Unary operators – using friend operators functions - Pointers

Creating your own manipulators – file I/O basis – unformed ,binary I/O –more unformatted I/O functions – random access – checking the I/o status – customized I/O and I/O and files – pointers and derived classes – introducing to virtual functions – applying polymorphism- Exception handling.

UNIT IV:

Linear data structure – concept and terminology – storage – structure for arrays – stacks – definition , operation – application of stack – recursion – polish expression – polish notation – queues – linked linear list – circular linked – double linear list.

Non linear data structure – trees – threaded binary trees – definition and concepts of binary trees – representation of binary trees –tree traversals.

UNIT – V:

Sorting Techniques : Bubble sort – selection sort – insertion sort – shell sort – merge sort – radix sort – topological sort – heap sort - **Searching Techniques** : Sequential search – binary search – binary tree search – analysis of searching algorithms – comparison of search algorithm.

TEXT BOOKS:

1. Herbert " teach your selfc++", III edition , tata McGraw hill 5 th reprint 2000
2. Alfred V. Aho ,John E. Hopcroft and Jeffrey .D Ullmap "Data Structure and Algorithms", Addison Wesley.

REFERENCE BOOKS:

1. S.Sahni , "Data Structure and Algorithms and Application in C++" McGrawHill, 1998.
2. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 1996
3. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla , — Data Structures and Program Design in C, Second Edition, Pearson Education, 2007

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Optimize the programming code with the help of Object oriented approach **K1**

CO2: Choose appropriate data structures to represent data items in real world problems **K2**

CO3: Analyze the time and space complexities of algorithms **K4**

CO4: Write the code for a large program after overcoming the time and space complexity. **K3**

CO5: Analyze and implement various searching and sorting techniques **K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	M	M	M	S	M	S	M	S
CO4	M	S	M	S	M	S	M	S	S	S
CO5	S	M	S	S	M	M	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20T12	**MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse		
Objectives	1. To impart basic foundation of mathematics for Computer Science 2. To familiarize with the basic terminology of functions, relations and demonstrate knowledge of their associated operations. 3. To inculcate logical thinking and promote arithmetic knowledge 4. To solve mathematical problems, apply various methods of mathematical proof and communicate solutions in writing.		

UNIT-I

LOGIC: IF Statements – Connectives – Atomic and Compound Statements – WFF – Truth Table of a Formula – Tautology – Tautological Implications and Equivalence of Formulae.

UNIT-II

NORMAL FORMS: Principal Normal Forms – Theory of Inference – Open Statements – Quantifiers – Valid Formulae and Equivalence – Theory of Inference for Predicate Calculus.

UNIT-III

GRAPH THEORY: Basic Concepts – Matrix representation of Graphs: Trees: Definition – Spanning Trees – Rooted Trees – Binary Trees

UNIT-IV

FORMAL LANGUAGES: Four class of grammars(phase structure, context sensitive, context free, regular) context free language – generation trees. Finite Automata: Representation of FA – Acceptability of a string by FA – Non deterministic FA (NDFA) - Acceptability of a string by NDFA. Equivalence of FA and NDFA – procedure for finding FA ~ NDFA.

UNIT-V

LATTICES AND BOOLEAN ALGEBRA: Lattices – properties – new lattices – modular and distribution lattices. Boolean algebra: Boolean polynomials – switching circuits.

TEXT BOOKS:

1. Discrete Mathematics – M.K.Venkatraman, N.Sridharan, N.Chandrasekaran, The National Publishing Company,2001. Chapters 9.1-9.56, 11.1-11.81, 12.1-12.20, 12.43-12.61, 7.1-7.39,7.48-7.53,10.1-10.42,10.71 460

REFERENCE BOOKS:

1. Modern Algebra by S.Arumugam & A.Thangapandi Issac, New Gamma Publishing House, Palayamkottai(for Units I,III)
2. Invitation to Graph Theory by S.Arumugam and S.Ramachandran, Scitech Publications, Chennai.(for Units IV, V)

COURSE OUTCOMES:

After successful completion of the course, student shall be able to:

CO1: Understand the complexity of computational problems **K2**

CO2: Think about the design of formal language which would be able to address any real time problem and improve the working flow of computational models. **K4**

CO3: Use tree and graph algorithms to solve problems **K3**

CO4: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra **K4**

CO5: Solve mathematical problems, apply various methods of mathematical proof and communicate solutions in writing. **K3**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	S	M	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	M	S	M	S	M	M	S	M	S	M
CO4	S	S	M	M	M	M	M	S	M	M
CO5	M	S	M	S	S	S	S	M	M	S

S – Strongly Correlating M- Moderately Correlating

PCA20T13	OPERATING SYSTEM		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse		
Objectives	1. To understand the basic concepts and working procedure of various Operating Systems. 2. To use the computer system resources in an efficient way. 3. To facilitate with effective development and implementation of new system functions. 4. Mastering in various process management concepts including scheduling, synchronization and deadlocks.		

UNIT-I

Introduction - Evolution of Operating Systems, Types of operating systems.

Process Management: Processes—States & Life cycle of process, Schedulers, Context Switching, Process scheduling policies—Preemptive vs. Non-preemptive, CPU scheduling algorithms, Inter-process Communication (IPC) Mechanisms—Concurrent processes, Process synchronization, Critical Section, Semaphores.

UNIT-II

Deadlock—Basic causes of deadlock, Conditions for deadlock, resource allocation graph, Wait for graph, Strategies for handling deadlocks, Starvation, deadlock avoidance & detection, Safe state, Dijikstra's Banker's Algorithm.

UNIT-III

Memory Management: Main Memory, Static & Dynamic Partition schemes, multiple partitions schemes, Fragmentation, Compaction, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory: Demand Paging, Thrashing.

UNIT-IV

Device management – Techniques for Device Management – Dedicated, Shared and Virtual Device – Virtual Systems – Design of Spooling System – OS Security – Security Measures and Cryptography

UNIT-V

Case Studies: DOS, UNIX and WINDOWS Operating Systems

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", Eighth Edition, 2009, Wiley India Pvt. Ltd., New Delhi.
   Reading Chapters: 1-15 & 19-22 (excluding chapters: 16, 17, 18, and 23).
2. Stuart E. Madnick John J. donovan, Operating Systems, McGraw-Hill

REFERENCE BOOKS:

1. Harvey M. Deitel, Paul J. Deitel, David R. Choffnes, "Operating Systems", Third Edition, 2004, Pearson Education Inc., New Delhi.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Third Edition, 2008, PHI Course Pvt. Ltd., / Pearson Education Inc., New Delhi.
3. RamezElmasri, A. G. Carrick, David Levine, "Operating Systems: A Spiral Approach", First Edition, 2009, McGraw-Hill Education (India), New Delhi.
4. Ann McIver Hoes and Ida M. Flynn, "Understanding Operating Systems", Fifth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
5. Gary Nutt, "Operating Systems", 3rdEdition, 2004, Pearson Education Inc., New Delhi.

6. William Stallings, "Operating Systems: Internals and Design Principles", Sixth Edition, 2009, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.

COURSE OUTCOMES:

After successful completion of the course, student shall be able to:
CO1: Understand the fundamental components of a computer operating system. **K2**
CO2: Have a Knowledge about the usage of resources in Computer System and process management system **K2**
CO3: Familiarize the policies for scheduling, deadlocks, memory management, synchronization, system calls and file systems. **K2,K4**
CO4: Aware about the Security Measures and Cryptography techniques in OS **K2**
CO5: Expertise to Configure Personal Computer with necessary resources **K3**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	S	M	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	M	S	M	S	M	M	S	M	S	M
CO4	S	S	M	M	M	M	M	S	M	M
CO5	M	S	M	S	S	S	S	M	M	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20T14	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse		
Objectives	1. To learn the organization of a computer and its principle components. 2. To understand the function of computer hardware and their building blocks. 3. To understand and appreciate Boolean algebraic expressions to digital design 4. To understand the hardware components of a digital system.		

UNIT – I

Introduction to computers: Number System – Data types – Data Representations – Fixed point, floating point, Gray, Excess – Alphanumeric codes – Binary codes – Error Detection codes.

UNIT – II

Arithmetic logic unit: Binary Half Adder , Full adder and their Designs – Positive and Negative Numbers, Binary Addition & subtraction Using 1s,2s,9s complements, binary Multiplication.

UNIT – III

MEMORY UNIT: Classification of memory: primary – secondary – cache memory – Associate memory – virtual memory – RAM, ROM

CONTROL UNIT: General Register Organization, Stack Organization, instruction formats, Addressing modes- Data Transfer and Manipulation instruction.

UNIT – IV

I/O Devices: punched tape, Tape Recorders, Punched Cards , Card readers – Printers – CRT Devices – Digital to Analog Converters, Analog to Digital Converters.

UNIT – V

Introduction to parallel processing – parallelism in Uniprocessor System – parallel Computer Structure.

TEXT BOOKS:

1. Albert Paul Malvino, Donald P. Leach – Digital Principles and Applications McGraw hill

2. M. Morris Mano - Computer System architecture, prentice Hall of India.

REFERENCE BOOKS:

1. Thomas C. Bartee – Digital Computer Fundamentals, McGraw Hill.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Understand the processing of Computer and the function of Memory and its types **K2**

CO2: Know about the function and organization of Input Output devices **K2**

CO3: Understand the digital representation of data in a computer system **K2**

CO4: Identify, understand and apply different number systems and codes **K3**

CO5: Understand computer arithmetic formulate and solve problems **K3, K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	S	M	M	M	M	M	M	S
CO2	S	M	S	M	M	M	M	M	M	S
CO3	S	M	S	M	M	M	M	S	M	S
CO4	S	S	S	M	S	M	M	S	M	S
CO5	M	S	M	S	S	M	M	S	S	M

S – Strongly Correlating **M- Moderately Correlating**

PCA20P16	**DATA STRUCTURE USING C++ LAB**		
	Semester I	**Credits:2**	**Hours: 3**
Objectives	1. To understand a software development problem and express it precisely. 2. To identify the objects of a system and to establish their relationships. 3. To implement a module structure this executes efficiently. 4. Able to generate a design which can be converted into applications with OO languages		

LIST OF PROGRAMS

1. Classes and objects.

2. Methods

3. Inheritance

4. Interfaces

5. Strings

6. Exceptions

7. Packages and visibility issues.

8. Using the AWT

9. Applets

10. Threads

11. Link List

12. Communications

PCA20P17	**R PROGRAMMING LAB**		
	Semester I	**Credits:2**	**Hours: 3**
Objectives	1. To provides the knowledge to Install R Programming. 2. To use R for simple programming tasks. 3. To extended R Libraries and Packages 4. To develop R Programs using Loop Constructs 5. To data exploration in R programs using Mathematical Functions.		

LIST OF PROGRAMES

1. Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.

2. Write a R program to get the details of the objects in memory.

3. Write a R program to create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.

4. Write a R program to create a vector which contains 10 random integer values between -50 and +50.

5. Write a R program to get the first 10 Fibonacci numbers.

6. Write a R program to get all prime numbers up to a given number (based on the sieve of Eratosthenes).

7. Write a R program to print the numbers from 1 to 100 and print "Fizz" for multiples of 3, print "Buzz" for multiples of 5, and print "FizzBuzz" for multiples of both.

8. Write a R program to extract first 10 English letter in lower case and last 10 letters in upper case and extract letters between 22nd to 24th letters in upper case.

9. Write a R program to find the factors of a given number.

10. Write a R program to find the maximum and the minimum value of a given vector.

11. Write a R program to get the unique elements of a given string and unique numbers of vector.

12. Write a R program to create three vectors a,b,c with 3 integers. Combine the three vectors to become a 3×3 matrix where each column represents a vector. Print the content of the matrix.

13. Write a R program to create a list of random numbers in normal distribution and count occurrences of each value.

14. Write a R program to read the .csv file and display the content. **15.** Write a R program to create three vectors numeric data, character data and logical data. Display the content of the vectors and their type.

16. Write a R program to create a 5 x 4 matrix , 3 x 3 matrix with labels and fill the matrix by rows and 2 × 2 matrix with labels and fill the matrix by columns.

17. Write a R program to create an array, passing in a vector of values and a vector of dimensions. Also provide names for each dimension.

18. Write a R program to create an array with three columns, three rows, and two "tables", taking two vectors as input to the array. Print the array.

19. Write a R program to create a list of elements using vectors, matrices and a functions. Print the content of the list.

20. Write a R program to draw an empty plot and an empty plot specify the axes limits of the graphic.

21. Write a R program to create a simple bar plot of five subjects marks. **22.** Write a R program to create bell curve of a random normal distribution.

23. Write a R program to compute sum, mean and product of a given vector elements.

24. Write a R program to create a list of heterogeneous data, which include character, numeric and logical vectors. Print the lists.

25. Write a R program to create a Dataframes which contain details of 5 employees and display the details.

26. Write a R program to create a Data Frames which contain details of 5 employees and display summary of the data.

27. Write a R program to create the system's idea of the current date with and without time.

SEMESTER II

PCA20T21	PROGRAMMING IN JAVA		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse		
Objectives	1. To understand the object-oriented paradigm in Java programming language. 2. To use the Java SDK environment to create, debug and run simple Java programs. 3. To develop an engineering approach to solve problems. **4.** To develop software with Java programming language.		

UNIT-I

INTRODUCTION-Literal-Data types-The structure of a Java Program - operators - Control statements - Arrays – Classes.

UNIT-II

Mathematical & String function – Inheritance-Interfaces and packages-Exception handling.

UNIT-III

Input and Output classes-Threads-Applets.

UNIT-IV

GRAPHICS PROGRAMMING WITH AWT-Event Handling- Windowing- Menus-Dialog -Swings.

UNIT-V

CLIENT-SERVER ARCHITECTURE-JDBC Introduction-Java database Connectivity-Simple JDBC application-Servelets-JSP.

TEXT BOOKS:

1. Herbet schildt,The complete Reference-Java2,4th Edition,Tata McGraw Hill 2001 (Unit 3,4&5)
2. Dr.k.Somasundram.”Programming in Java2”,Jaico Publishing house-2008
3. Er.V.k.Jain , Programming Java Server pages &Servlets-Dream tech press 2000.

REFERENCE BOOKS:

1. Steven Holzer,JAVA 2 Swing Servlets,JDBC,Java beans Programming, Dream Tech press Revised Edition.
2. Jaime jaworski,Java 2 Platform Unleashed,Techmedia.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Design, create, build and debug Java applications and applets **K3, K3& K5**

CO2: Write programs using OOPs concept, graphical user interface (GUI) components and Java's Event Handling Model **K3**

CO3: Solve inter-disciplinary applications using the concept of inheritance **K3 & K4**

CO4: Apply JDBC to provide a program level interface for communicating with database using Java programming **K3**

CO5: Develop software with Java programming language **K3**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	S	M	S	M	M	S	M	S
CO2	M	S	S	M	M	S	M	S	S	M
CO3	M	M	M	S	S	M	S	M	M	S
CO4	M	M	M	S	S	M	M	S	S	M
CO5	M	M	M	S	S	S	S	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20T22	**SOFTWARE ENGINEERING**		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse		
Objectives	1. To understand the concepts and methods required for the construction of effective Software. 2. To understand the issues affecting the organization, planning and control of software. 3. To identify, formulate, and solve software engineering problems using a well-defined engineering process **4.** To demonstrate the ability to work effectively as a team leader/ Software Analyst in professional environments.		

UNIT-I

INTRODUCTION: Evolution and impact of Software Engineering, Socio-technical Systems, Critical Systems, Software Processes, and Software Life cycle Models, Software Project Management.

UNIT-II

REQUIREMENTS & SPECIFICATION: Software Requirements, Requirements Engineering Processes, Feasibility study, Requirements analysis and specification, System Models, Critical System Specification, Formal Specification.

UNIT-III

DESIGN AND ANALYSIS ASPECTS: Architectural Design – Cohesion and coupling, Abstraction, Data flow Oriented Design, Distributed Systems Architecture, Application Architectures, Object-Oriented Design, Real-time Software Design, User Interface Design and Usability Engineering. Implementation and Testing: Verification and validation, Software Testing, Critical Systems validation.

UNIT-IV

SOFTWARE RELIABILITY AND QUALITY MANAGEMENT: Musa's Reliability Model, Managing People, Software Cost Estimation- COCOMO Model, Quality Management, Process Improvement, Configuration Management, Software Maintenance.

UNIT-V

MODERN TRENDS AND EMERGING TECHNOLOGIES: Humphrey's Capability Maturity Model, CMMI(Capability Maturity Model Integration), Agile software development, Extreme Programming (XP), Security Engineering, Service-oriented Software Engineering, Aspect-oriented Software Development.

TEXT BOOKS:

1. Rajimmall, "Fundamentals of Software Engineering", 2nd Edition,2007, PHI Learning Pvt. Ltd. New Delhi.

2. Ian Sommerville, "Software Engineering", 8th Edition,2007, Pearson Education Inc., New Delhi.

REFERENCE BOOKS:

1. Roger S.Pressman, "Software Engineering: A Practitioner's Approach", 7th International Edition, McGraw-Hill Education(Asia),Singapore.
2. Shari Lawrence P Fleeger, Joanne M. Atlee, "Software Engineering", 3rd Edition(2006), Pearson Education ,Inc. New Delhi
3. Ben Shneiderman, Catherine Plaisant, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", 4th Edition (2006), Pearson Education, Inc. New Delhi.
4. Pankaj Jalote, "Software Engineering", First Edition, 2009, Wiley India Pvt. Ltd., New Delhi.
5. Dines Bjorner, "Software Engineering: Volume-1, Volume-2 & Volume-3", Springer India Pvt. Ltd., New Delhi.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Understands the process to be followed in the software development life cycle **K2**

CO2: Find practical solutions to the problems **K4**

CO3: Adapt the basic software engineering methods and practices in their appropriate applications **K3**

CO4: Distinguish the various software process models **K4**

CO5: Analyze, design and maintain software systems **K3 & K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	M	S	M	M	S	M	S	M	M	M
CO3	S	S	M	S	M	M	M	S	M	M
CO4	S	M	S	M	M	M	M	S	M	M
CO5	S	M	S	M	M	S	S	M	M	S

S – Strongly Correlating M- Moderately Correlating

PCA20T23	DATABASE MANAGEMENT SYSTEMS		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K6:** Create		
Objectives	1. To Learn and practice data modeling using the entity-relationship and develop database designs. 2. To understand the use of Structured Query Language (SQL). 3. To apply normalization techniques to standardize the database. **4.** To inculcate the ability to design and implement a database schema for real time problem		

UNIT-I

INTRODUCTION: Database System Applications – Purpose of Database Systems – View of Data – Database Languages – Relational Databases – Database Design – Object based and semi Structured databases – Data Storage and Querying – Database Users and Administrators – Transaction Management – Database users and Architectures – History of database System.

ENTITY-RELATIONAL MODEL: E-R model – Constraints – E-R diagrams – E-R design issues – Weak Entity Sets – Extended E-R Features.

UNIT-II

RELATIONAL DATABASE DESIGN: Features of Good Relational Designs – Atomic domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Decomposition using Functional – Decomposition using multivalued dependencies – more Normal Forms – Database Design Process – Modeling temporal data.

UNIT-III

DATABASE SYSTEM ARCHITECTURE: Centralized and Client-Server Architecture – Server System Architecture – Parallel Systems – Distributed Systems – Network types.

PARALLEL DATABASES: I/O parallelism – Interquery Parallelism – Intraquery Parallelism.

DISTRIBUTED DATABASES: Homogeneous and Heterogeneous databases – Distributed Data Storage – Distributed Transactions – Distributed Query Processing.

UNIT-IV

SCHEME OBJECTS: Data Integrity – Creating and Maintaining Tables – Indexes – Sequences – Views – Users Privileges and Roles – Synonyms.

UNIT-V

PL/SQL: PL/SQL – Triggers – Stored Procedures and Functions – Package – Cursors – Transactions.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth & Sudarshan, "Database System Concepts ", 5th Ed., McGraw Hill International Edition, 2006.
2. Jose A.Ramalho – Learn ORACLE 8i BPB Publications 2003.

REFERENCE BOOKS:

1. Philip J.Pratt, Joseph J Adamski, "Database Management Systems", Cengage Learning, 2009.
2. RameezElmasri, Shamkant B.Navathe, "Fundamentals of Database Systems", 5th Ed., Pearson Education, 2009.
3. Arun K Majumdar, Pritimoy Bhattacharyya, "Database Management Systems", TMH, 2009.
4. ISRD group, "Introduction to Database Management Systems", TMH, 2008.
5. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill International Edition, 2003.
6. Ramon A Mata-Toledo, Pauline K Cushman, "Database Management Systems", TMH, 2008.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Understand the use of Structured Query Language (SQL) **K2**
CO2: Create E/R models from application descriptions. **K3**
CO3: Apply normalization techniques to standardize the database. **K3 & K4**
CO4: Design and implement a database system for real time problem **K6**

CO5: Create databases in an RDBMS and enforce data integrity constraints and queries using SQL **K6**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	S	M	M	S	M	S	M	M
CO2	M	M	M	S	S	M	S	M	M	S
CO3	M	M	M	S	S	S	S	M	S	S
CO4	M	M	S	S	S	S	S	M	S	S
CO5	M	M	S	S	S	S	S	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20T24	**COMPUTER NETWORKS**		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K5:** Evaluate		
Objectives	1. To describe and analyze the hardware, software components of a network and their interrelations. 2. To learn and analyze the datalink, network, and transport layer protocols 3. To design and implement datalink or network layer protocols within a simulated networking environment 4. To use Data Communication system along with its components.		

UNIT-I

INTRODUCTION TO DATA COMMUNICATIONS AND NETWORKING: Evolution of Computer Networks, General Principles of Network Design: Topologies, Network Models (ISO-OSI, TCP/IP), Network Architecture & Standardization (IEEE802.x).

UNIT-II

PHYSICAL LAYER: Theoretical Basis for Data Communication-Data, Throughput, Bandwidth, Bit rate, Baud Rate, Data Rate measurement – Multiplexing, Transmission Media (Guided Media, Unguided Media: Wireless), Switching (Circuit, Message, Packet).

UNIT-III

DATA LINK LAYER: Data Link Layer Design Issues, Error detection and Correction, Data Link Control, Elementary Data Link Protocols, Network devices: Repeater, Hubs, Bridges, Switches, Routers, Gateways, Backbone networks and Virtual LANs, Wireless WANs. Network layer: Network Layer Design Issues, Logical Addressing, Internet Protocol, Address Mapping, Error Reporting and Multicasting, Delivery, Forwarding, Routing Algorithms.

UNIT-IV

TRANSPORT LAYER: Transport Service, Elements of Transport Protocols, UDP, TCP.

APPLICATION LAYER: DNS, Remote Logging, File Transfer, SNMP, Multimedia.

UNIT-V

SECURITY: Cryptography, Network Security, Kerbers; Internet Security IPSec, PGP, VPN, Firewalls.

TEXT BOOKS:

1. Behrouz A.Forouzan, "Introduction to Data Communications and Networking", Fourth Edition, 2007, McGraw-Hill Education (India), New Delhi.
2. Natalia Olifer & Victor Olifer, "Computer Networks: Principles, Technologies and Protocols", First Edition, 2006, Wiley India Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, 2003, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.
2. James F. Kurose, Keith W. Rose, Computer Networking: A Top-Down Approach Featuring the Internet", 4th Edition (2008), Pearson Education Inc., New Delhi.
3. Wayne Tomasi, "Introduction to Data Communications and Networking", First Edition, 2005, Pearson Education Inc., New Delhi.
4. PrakashGupta, "Data Communications and Networking", First Edition, 2008, PHI Learning Pvt., Ltd., New Delhi.
5. Curt White, "Data Communications and Networking", First Edition, 2008, CENGAGE Learning India Pvt. Ltd., New Delhi.
6. L.L. Peterson & B.S.Davile, "Computer Networks", Fourth Edition, Elsevier Inc,

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Have a good understanding of the OSI Reference Model and TCP/IP Model and in particular have a good knowledge of Layers. **K2**

CO2: Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies. **K4**

CO3: Design and implement network layer protocols within a simulated networking environment **K3**

CO4: Explore the basis of computer networks and various protocols and understand the World Wide Web concepts **K5**

CO5: Administrate a network and flow of information and predict ethical, legal, security and social issues related to computer networks **K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	S	M	M	S	M	M	M	S
CO2	M	S	S	M	M	M	M	S	M	M
CO3	M	M	S	S	S	M	S	M	M	S
CO4	S	M	S	M	M	S	M	M	M	S
CO5	M	M	S	S	S	M	S	M	M	S

S – Strongly Correlating M- Moderately Correlating

PCA20P26	**JAVA PROGRAMMING LAB**		
	Semester II	**Credits:2**	**Hours: 3**
Objectives	1. To understand the of object-oriented paradigm in the Java programming language. 2. To use the Java SDK environment to create, debug and run simple Java programs. 3. To develop an engineering approach to solve problems. 4. Able to develop programs using API as well as java Standard Library.		

LIST OF PROGRAMS

1. Classes and objects, constructors
2. Method overloading, Inheritance
3. Polymorphism
4. Packages and interfaces
5. String handling
6. Exception handling
7. Multithreading
8. Input/output streams
9. Networking (TCP, UDP)
10. Applets with AWT controls
11. JDBC

PCA20P27	**DBMS LAB**		
	Semester II	**Credits:2**	**Hours: 3**
Objectives	1. To understand the concepts and techniques relating to ODBC. 2. To understand and analyze the underlying concepts of database technologies 3. To present SQL and procedural interfaces to SQL 4. Able to Design and implement a database schema for a given problem-domain.		

LIST OF PROGRAMS

1. Creation of base tables and views.
2. Data Manipulation INSERT, DELETE and UPDATE in Tables. SELECT, Sub Queries and JOIN
3. Data Control Commands
4. High level language extensions – PL/SQL. Or Transact SQL – Packages
5. Use of Cursors, Procedures and Functions
6. Embedded SQL or Database Connectivity.
7. Oracle or SQL Server Triggers – Block Level – Form Level Triggers
8. Working with Forms, Menus and Report Writers for a application project in any domain
9. Front-end tools – Visual Basic.

SEMESTER III

PCA20T31	**WEB TECHNOLOGY**		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K6:** Create		
Objectives	1. To learn markup languages for processing, identifying, and presenting information in web pages. 2. To use scripting languages and web services to transfer data and add interactive components to web pages. 3. To create and manipulate web media objects using editing software 4. Able to design Web based applications.		

UNIT–I

HTML & CSS: HTML Introduction – Basic HTML – The Document Body – Text – Hyperlinks –Adding More Formatting – Lists – Tables – Using Color and Images – Images –Multimedia Objects – Frames –Forms – The HTML Document Head in Detail – XHTML – CSS Introduction – Using Styles – Defining your Own Styles – Properties and Values in Styles – Formatting Blocks – Layers.

UNIT–II

XML & Ajax: Basic XML – Document Type Definition – XML Schema – Document Object Model – Presenting XML –Using XML Parser - Essential Ajax - Ajax and the DOM, XML, CSS and Dynamic HTML.

UNIT–III

JAVA Script: What is Dynamic HTML – Java Script Basics – Variables – String Manipulation –Mathematical Functions – Statements – Operators – Arrays – Functions – Data and Objects – Regular Expressions –Exception Handling – Built-in Objects – Events –Dynamic HTML with Java Script

UNIT–IV

PHP & MySQL: Why PHP and MySQL - Server-Side Web Scripting - Getting Started with PHP - Adding PHP to HTML -Syntax and Variables - Control and Functions - Passing Information between Pages – Strings – Arrays and Array Functions – Numbers - MySQL Database Administration - PHP/MySQL Functions -Displaying Queries in Tables - Building Forms from Queries.

UNIT–V

Perl: The Basic Perl Program – Scalars – Arrays – Hashes Control Structures – Processing Text – Regular Expressions – Using Files – Subroutines – Bits and Pieces –Handling XML with Perl – Handling the DOM with Perl.

TEXT BOOKS:

1. Web Programming (Building Internet Applications), Chris Bates 2nd edition, Wiley India private Ltd; New Delhi- 2002. Chapters Covers: 1-8, 14

2. Ajax Bible,Steven Hoizner,Wiley India private Ltd;NewDelhi-2007Chapters Covers1,8-11

3. PHP5 and MySQL Bible, Tim Converse and Joyce Park with Clark Morgan, Wiley Publishing, Inc. 2004. Chapters Covers: 1-10, 14-17

REFERENCE BOOKS:

1. Steven M. Schafer, “HTML, CSS, JavaScript, Perl, Python and PHP - Web standards Programmer’s Reference”, Wiley Publishing, Inc. 2005.

2. Mitch Conrad, Kay Ether, Michal D. Thomas, "XML problem Design – solution”, Wiley India private Ltd; New Delhi- 2006.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Develop a dynamic webpage by the use of java script and DHTML **K6**

CO2: Connect a java program to a DBMS and perform insert, update and delete operations on DBMS table **K3**
CO3: Expertise to create web media object using Editing Software **K3**
CO4: Familiarize and apply the Perl concept with MySQL **K2, K4**
CO5: Aware about the WWW architecture and its communication protocol **K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	S	M	M	S	M	M	M	S
CO2	M	S	S	M	M	M	M	S	M	M
CO3	M	M	S	S	S	M	S	M	M	S
CO4	S	M	S	M	M	S	M	M	M	S
CO5	M	M	S	S	S	M	S	M	M	S

S – Strongly Correlating M- Moderately Correlating

PCA20T32	DATA MINING		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K5:** Evaluate		
Objectives	**1.** To introduce the basic concepts of Data Mining techniques. **2.** To familiarize the types of the data to be mined and apply preprocessing methods on raw data. **3.** To identify and address problems with Data Mining Methods. **4.** Able to understand and analyze supervised and unsupervised models and estimate the accuracy of the algorithms.		

UNIT–I: DATA MINING: Introduction – Kinds of data can be mined, Kinds of patterns can be mined, Technologies used, Kinds of application targeted, Major issues in data mining.

GETTING TO KNOW YOUR DATA: Data objects & attribute types. Basic statistical description of data, data visualization.

UNIT–II: DATA PREPROCESSING: Overview, Data cleaning, Data integration, Data reduction, Data transformation and Data discretization.

UNIT–III: DATA WAREHOUSE AND OLAP: Basic Concepts, data warehouse modeling data cube and OLAP, data warehouse design and usage.

DATA CUBE TECHNOLOGY: Data cube computation: Preliminary concepts, Data cube computation methods.

UNIT–IV: ASSOCIATION: Basic concepts, Frequent itemset mining methods.

CLASSIFICATION: Basic concepts decision tree induction**.**

UNIT–V : CLUSTER ANALYSIS: Basic concepts, partitioning methods

WEB MINING: web mining, web content mining, web structure mining, semantic web mining, text mining, image mining.

TEXT BOOKS:

1. "Data Mining Concepts and Techniques" by Jiaweihen, Michelin Kamber, Jian pie III edition, Elsevier publication.

REFERENCE BOOKS:

1. "Data mining methods" by Rajanchattamvelli, Narosa publishing house

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:
CO1: Interpret the contribution of data warehousing and data mining to the decision-support level of organizations. **K2, K5**

CO2: Evaluate different models used for OLAP and data preprocessing**. K5**

CO3: Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, cluster, and outlier analysis. **K4**

CO4: Design and implement systems for data mining**. K3**

CO5: Evaluate the performance of different data-mining algorithms. **K4,K5**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	S	M	M	S	M	M	M	S
CO2	M	S	S	M	M	M	M	S	M	M
CO3	M	M	S	S	S	M	S	M	M	S
CO4	S	M	S	M	M	S	M	M	M	S
CO5	M	M	S	S	S	M	S	M	M	S

S – Strongly Correlating M- Moderately Correlating

PCA20T33	**MACHINE LEARNING TECHNIQUES**		
	Semester III	**Credits: 4**	**Hours: 4**
Cognitive Level	**K2**-Understand **K4**-Analyze **K6**-Create		
Objectives	**1.** To Learn about Machine Intelligence and Machine Learning applications 2. To implement and apply machine learning algorithms to real-world applications. 3. To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems. 4. To understand how to perform evaluation of learning algorithms and model selection.		

UNIT-I: INTRODUCTION: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT-II: NEURAL NETWORKS AND GENETIC ALGORITHMS :Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT-III: BAYESIAN AND COMPUTATIONAL LEARNING : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT-IV: INSTANT BASED LEARNING : K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT-V

ADVANCED LEARNING : Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TEXT BOOK:

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCE BOOKS:

1. EthemAlpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, "Genetic Algorithms and Genetic Programming", CRC Press Taylor and Francis Group.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Have a good understanding of the fundamental issues and challenges of machine learning concept **K2**

CO2: Understand, Analyse and identify the strengths and weaknesses of many popular machine learning approaches. **K2, K4**

CO3: Aware about the underlying mathematical relationships across Machine Learning algorithms and the paradigms of supervised and un-supervised learning. **K2**

CO4: Ability to design and implement various machine learning algorithms in a range of real-world applications. **K4, K6**

CO5: Perform evaluation of machine learning algorithms and model selection. **K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S		S		M	M	M	S	M
CO2	S	S		S	M	M	M	M	S	
CO3	S	M	M	S		M	M	M	S	M
CO4	M	S	S		M	S	M	S		S
CO5	M	S	S		M	S	M	S		S

S – Strongly Correlating **M- Moderately Correlating**

PCA20T34	**DIGITAL IMAGE PROCESSING**		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K6:** Create		
Objectives	1. To know the basic components of an image processing system. 2. To Analyze and implement image processing algorithms 3. To understand the differences between computer vision and image processing. **4.** To develop Application-Specific Algorithms for image processing		

UNIT-I:

INTRODUCTION – The Origins of Digital Image Processing – Application of Digital Image Processing – Fundamental Steps in Digital Image Processing – Component of Image Processing System

FUNDAMENTALS: Image Acquisition Using a Single Sensor – Image Acquisition Using Sensor Arrays

UNIT-II: IMAGE SAMPLING AND QUANTIZATION: Basic concepts-Representing Digital Images – Spatial and Grey Level Resolution-Aliasing &more patterns – Zooming and Shrinking Digital Images

BASIC RELATIONSHIPS BETWEEN PIXELS: Neighbors of a Pixel – Adjacency, Connectivity, Regions and Boundaries – Distance Measures, Image Operations on a Pixel Basis

UNIT-III: COLOR IMAGE PROCESSING: Fundamentals-color models: RGB color model-CMY and CMYK color model-HIS model-Color Image smoothing &color Image sharping

IMAGE ENHANCEMENT IN SPATIAL DOMAIN: Gray Level Transformation – Image Negatives – Log Transformations –Piecewise-Linear transformation function-Enhancement Using Arithmetic/Logic Operations – Image Subtraction – Image Averaging

UNIT-IV: IMAGE COMPRESSION: Fundamentals-Coding Redundancy – Inter pixel Redundancy – PsychoVisual Redundancy – Image Compression Models – The Source Encoder and Decoder – The Channel Encoder and Decoder

UNIT-V: IMAGE SEGMENTATION: Detection of Discontinuities Point Detection – Line Detection – Edge Detection

REPRESENTATION OF IMAGES: Chain Codes – Polygonal Approximation – Signatures – Boundary Segments – Skeletons

TEXT BOOKS:

1. "Digital Image Processing" – Second Edition – Rafael C.Gonzalez and Richard E.Woods

REFERENCE BOOKS:

1. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 1995.
2. Sid Ahme M.A, "Image Processing", McGraw Hill Inc, 1995
3. Gonzalaz R and Wintz P., "Digital Image Processing", Addison Wesley, 2nd Ed, 1987

COURSE OUTCOMES:

After completion of the course, Student shall be able to

CO1: Explain how digital images are represented and manipulated in computer **K2**

CO2: Understand different image enhancement techniques and image transforms **K2**

CO3: Analyze the basic algorithms used for image processing and image compression with morphological image processing **K4**

CO4: Write a program to implement fundamental image processing algorithms **K3**

CO5: Develop real world applications using different image processing techniques **K6**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20P36	**WEB TECHNOLOGY LAB**		
	Semester III	**Credits:5**	**Hours: 5**
Objectives	1. To create an adaptive web pages 2. To use JavaScript for dynamic effects. 3. To create and manipulate web media objects using editing software 4. Able to design Web based applications.		

LIST OF PROGRAMMES

1. Simple HTML Pages using Tables, Frames

2. Java Script for a Mathematical Calculator

3. Java Script – Games such as Number Puzzle, Magic Square, Games using Random number generation

4. Online Quiz using Java Script

5. Validation of name, mobile number, date of birth, email id using Java Script

6. Design of style sheets using CSS and using various style attributes like text-decoration, text-transform

7. Java Script for validating XML against a DTD

8. Simple Servlets for handling HTTP Get and Post Requests

9. Servlets using JDBC for display of student results

10. A Simple Search Engine using JSP

11. Creation of a login form and validating the user using JSP

12. A Page Hit Counter using JSP

13. Designing a Web page that accesses a database via JDBC.

PCA20P37	PYTHON PROGRAMMING LAB		
	Semester III	**Credits:5**	**Hours: 5**
Objectives	1. To create simple Python programs. 2. To understand the scripting language of Python. **3.** To apply object-oriented programming methodology using Python. 4. Able to design and program Python applications.		

LIST OF PROGRAMMES

1. Compute the GCD of two numbers.

2. Find the square root of a number (Newton's method)

3. Exponentiation (power of a number)

4. Find the maximum of a list of numbers

5. Linear search and Binary search

6. Selection sort, Insertion sort

7. Merge sort

8. First n prime numbers

9. Multiply matrices

10. Programs that take command line arguments (word count)

11. Find the most frequent words in a text read from a file

12. Simulate elliptical orbits in Pygame

13. Simulate bouncing ball in Pygame

ELECTIVE I

PCA20E15	DESIGN AND ANALYSIS OF ALGORITHMS		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 -** Understand **K3 -** Apply		
Objectives	1. To learn effective problem solving in Computing applications and determine the computational complexity of algorithms. 2. Specify, analyze and design the use case driven requirements for a particular system. 3. Model the event driven state of object and transform them into implementation specific layouts. 4. Identify, Analyze the subsystems, various components and collaborate them interchangeably.		

UNIT I: INTRODUCTION: Algorithm Definition – Algorithm Specification – Performance Analysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

UNIT-II: DIVIDE AND CONQUER: The General Method – Defective Chessboard – Binary Search – Finding the Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

UNIT-III : THE GREEDY METHOD: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

UNIT-IV : DYNAMIC PROGRAMMING: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

UNIT-V : BACKTRACKING: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost search - 0/1 Knapsack Problem.

TEXT BOOKS:

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

REFERENCE BOOKS:

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.
4. Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen, "Evolutionary Algorithms for Solving Multi-Objective Problems", Springer 2nd Edition, 2007.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Aware about the problem solving techniques in Computing applications **K2**
CO2: Have a knowledge about the computational complexities of Algorithm **K2**
CO3: Aware about the structural behavioral concepts of the system **K2**
CO4: Understand the importance of dynamic programming & Greedy method **K2**
CO5: Apply the concepts of architectural design for deploying the code for software. **K3**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20E15	**MULTIMEDIA SYSTEMS**		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K3 –** Apply **K4 –** Analyze **K5 –** Evaluate		
Objectives	1. To understand the standards available for different audio, video and text applications 2. To learn various multimedia authoring systems in multimedia production team 3. Adoption of factual knowledge and development of skills needed for independent development of multimedia systems 4. Applications using available hardware and software tools.		

UNIT-I

MULTIMEDIA DEFINITION: Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

UNIT-II

IMAGES: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. **SOUND:** The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

UNIT-III

ANIMATION: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. **VIDEO:** Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

UNIT-IV

MAKING MULTIMEDIA: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs- Multimedia Production Team.

UNIT-V

PLANNING AND COSTING: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.

TEXT BOOKS:

1.Tay Vaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGraw-Hill, 2001.

REFERENCE BOOKS:

1.Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:
CO1: Describe the types of media and define multimedia system. **K4,K5**

CO2: Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video). **K5**

CO3: Use and apply tools for image processing, video, sound and animation. **K3,K4**

CO4: Apply methodology to develop a multimedia system. **K3**

CO5: Apply acquired knowledge in the field of multimedia in practice and independently continue to expand knowledge in this field. **K3**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20E15	OPEN SOURCE TECHNOLOGY		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K3 –** Apply		
Objectives	1. Introduces Open Source methodologies. 2. To make the students to gain experience using open source tools, languages and frameworks 3. To prepare for careers in software development. 4. To understand open source scripting language for programming in web environment i.e. PHP.		

UNIT-I: INTRODUCTION: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History : BSD, The Free Software Foundation and the GNU Project.

UNIT-II: OPEN SOURCE HISTORY: Initiatives, Principle and methodologies. **PHILOSOPHY:** Software Freedom, Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copylefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization

UNIT-III: COMMUNITY BUILDING: Importance of Communities in Open Source Movement-JBoss Community- Starting and Maintaining an Open Source Project - Open Source Hardware

UNIT-IV: Apache HTTP Server and its flavors- WAMP server (Windows, Apache, MySQL, PHP)- Apache, MySQL, PHP, JAVA as development platform.

UNIT-V: OPEN SOURCE VS. CLOSED SOURCE: Open source government, Open source ethics. Social and Financial impacts of open source technology, Shared software, Shared source.

TEXT BOOKS:

1. Sumitabha Das "Unix Concepts and Applications, Tata McGraw Hill Education 006
2. The Official Ubuntu Book, 8th Edition
3. Kailash Vedera, Bhavyesh Gandhi, "Open Source Technology", University Science press, ker

REFERENCE BOOKS:

1. Paul Kavanagh, "Open Source Software: Implementation and Management", Elsevier Digital Press

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Leaned the need of open source technology, open source development model, application of open sources, aspects of open source movement **K2**

CO2: Aware about the problems with traditional commercial software. **K2**

CO3: Familiar with basis syntax of PHP, common PHP scripts elements. **K2**

CO4: Familiar with creating of the server side scripting using PHP, implement PHP database connectivity, perform operation on database and open source database management system. **K2 , K3**

CO5: Aware about the software tool and process like Eclipse IDE, Selenium ID. **K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20E15	**MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING**		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K1 –** Recall **K2 –** Understand **K3 –** Apply **K4 –** Analyse **K5 –** Evaluate		
Objectives	1. To study the architecture of 8085 processor. 2. To write simple assembly level programming 3. To understand the basic 16-bit (8086) processor and an 8-bit (8051) controllers, their architecture , internal organization and their functions, interfacing an external device with the processors/ controllers. 4. Memory interface to 8086. Interrupts in 8086. Parallel and serial data transfer methods. 8255 PPI chip. I/o interface method.		

UNIT-I

ARCHITECTURE AND OPERATION: Introduction to 8085, Microprocessor organization/ architecture & its operation Microprocessor based system, memory interfacing, basic interfacing concepts ,interfacing I/O devices

UNIT-II

PROGRAMMING THE 8085: Programming model, instruction classification, Instruction format, addressing modes, writing assembly level programs-overview of instruction set, timing diagrams data transfer, Arithmetic, Logic branch operations.

UNIT-III

PROGRAMMING TECHNIQUES: Looping Counting and Indexing, 16 bit arithmetic operations , logic operations Compare and rotate operations . Counters and Time delays, Generation of pulse waveforms. Stacks and subroutines- conditional CALL and RETURN instructions. Advanced subroutine concepts. BCD to Binary and Binary to BCD conversions, BCD to 7 segment conversion , Binary to ASCII and

ASCII to Binary code conversion, BCD addition and subtraction , multiplication and division.

UNIT–IV

MEMORY INTERFACE: Memory and I/O mapping and interfacing concepts. Interrupts : 8085 vectored interrupts , Restart as Software instructions, additional I/O concepts and processes.

UNIT–V

INTERFACING OF PERIPHERALS (I/OS) AND APPLICATIONS: Interfacing Keyboard (linear and matrix) and 7 segment display including multiplexes, 8279 programmable keyboard /display interface, 8255 PPI , 8259 PIC , DMA and 8257 DMA controller , Serial communication using 8251, D to A converters and interfacing, RS323 serial Page 31 of 38 communication standards.

TEXT BOOKS:

1.R.S.Gaonkar – Microprocessor Architecture , Programming and Application with 8085. Penram Int., 3rd Edn.

REFERENCES BOOKS:

1. Kenneth L.Short - Microprocessor and Programmed Logic ", PHI , 2nd Edn.

2. Aditya P. Mathur- Introduction to Microprocessors, 3RD Edn. TMH

3. Douglas V.Hall- Microprocessors and digital systems, McGraw Hill

4. Antonakos: Introduction to Intel family of Microprosessors Pearson Education

COURSE OUTCOMES: (Excess)

CO1: recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system. **K1, K3**

CO2: identify a detailed s/w & h/w structure of the Microprocessor. **K2**

CO3: illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor. **K2**

CO4: distinguish and analyze the properties of Microprocessors & Microcontrollers. **K5**

CO5: analyze the data transfer information through serial & parallel ports. **K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20T15	**NETWORK SECURITY**		
	Semester I	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K4:** Analyse **K5:** Evaluate **K6:** Create		
Objectives	1. To learn the network security concepts: vulnerability, threat and attack 2. To understand symmetric and asymmetric encryption processes. 3. To learn about the various issues and treats of network security 4. To create the ability to design a security model to prevent, detect and recover from the attacks.		

UNIT-1:

INTRODUCTION: Services and Mechanism: Security Attacks, Security services-Classical Encryption techniques-Cipher Principles-Data Encryption Standard-Block Cipher Design Principles and modes of Operation-Evaluation criteria for AES- AES Cipher- Triple DES- Placement of Encryption function- Traffic Confidentiality.

UNIT-2:

PUBLIC KEY CRYPTOGRAPHY: Key Management- Diffie - Hellman Key Exchange-Elliptic Curve Architecture and Cryptography-Introduction to Number Theory- confidentiality using Symmetric .Encryption-public Key Cryptography and RSA.

UNIT-3:

AUTHENTICATION AND HASH FUNCTION: Authentication requirements-Authentication functions-Message Authentication Codes –Hash functions-Security of Hash Functions and MACs-MD5 message algorithm-secure Hash Algorithm-RIPEMD-HMAC Digital Signatures-Authentication Protocols-Digital Signature Standard.

UNIT-4:

NETWORK SECURITY: Authentication Applications: Kerberos-X.509 Authentication Service-Electronic Mail Security-

PGP-S/MIME-IP Security, Network Security: Electronic mail security, IP Security, Network Management Security

UNIT-5:

SYSTEM LEVEL SECURITY: Intrusion detection-password management-Viruses and related Threats-Virus Counter measures -Firewall Design principles –Trusted Systems, SSL, SET, Intrusion Detection.

TEXT BOOKS:

1. Williams Stallings "Cryptography and Network Security-Principles and Practices", Prentice Hall of India, Third Edition, 2003.

REFERENCE BOOKS:

1. Atual Kahate , Cryptography and Network Security, McGraw Hill.
2. Bruce Schenier , "Applied Cryptography', John Wiley & Sons Inc,2001.

COURSE OUTCOMES:

After successful completion of the course, Student shall be able to:

CO1: Understand the design issues in Network Security **K2**

CO2: Understand the network security services and mechanisms **K2**

CO3: Evaluate authentication and hash algorithms. **K4**

CO4: Identify security threats, security services and mechanisms to counter them. **K5**

CO5: Design a security model to prevent, detect and recover from the attacks. **K6**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	S	M	M	M	M	S	M	M
CO2	S	M	S	S	S	M	S	M	M	S
CO3	S	M	S	S	M	M	S	M	S	M
CO4	M	M	M	S	S	S	S	M	M	S
CO5	M	M	S	S	S	S	S	M	S	S

S – Strongly Correlating M- Moderately Correlating

ELECTIVE II

PCA20E25	RESOURCE MANAGEMENT TECHNIQUES		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K5:** Evaluate		
Objectives	1. To understand the mathematical tools that are needed to solve optimization problems. 2. To provide Basic skills and knowledge of operations research and its application 3. To apply the techniques used in operations research to solve real life problem 4. To understand the operational research models from the description of the real-world systems.		

UNIT-I: Development of OR- Definition OR- General methods for solving OR models –Phases of OR study – tools, techniques and methods – scientific methods in OR .

UNIT-II: Linear Programming Problem – Mathematical formation of LPP – Stack and surplus variables – graphical solution of LPP

UNIT-III: Simplex method – Computational procedure –Two phase method – Duality in LPP

UNIT-IV: Mathematical Formulation of transportation problem – optimal solution of T.P – Methods for obtaining an initial feasible solution – Optimal solution – Handling Degeneracy in T.P

UNIT-V: Mathematical Formulation of Assignment problem – Solution to assignment problems – optimal solution of assignment problem – Unbalanced Assignment solution

TEXT BOOKS:

1. Operation Research – S.D.Sharma(Kedarnath Ramanath & COBOL) Chapter 1 to 6 (all section).

REFERENCE BOOKS:

1. Paneer Selvam, „Operations Research", Prentice Hall of India, 2002
2. Anderson "Quantitative Methods for Business", 8th Edition, Thomson Learning, 2002.
3. Winston "Operation Research", Thomson Learning, 2003.
4. Vohra, "Quantitative Techniques in Management", Tata Mc Graw Hill, 2002.
5. Anand Sarma, "Operation Research", Himalaya Publishing House, 2003

COURSE OUTCOMES:

After completion of the course, student shall be able to

CO1: Solve optimization problems using mathematical tools **K2 & K3**

CO2: Solve transportation and assignment problems **K4**

CO3: Apply integer programming and linear programming to solve real life applications **K4**

CO4: Design simple operation research models to improve decision making **K3**

CO5: Solve networks problems using CPM/PERT **K4 & K5**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	S	M	M	M	M	S	M
CO2	S	S	M	S	M	M	M	M	S	M
CO3	M	S	S	S	M	M	S	M	S	M
CO4	M	M	S	M	M	M	S	M	M	S
CO5	M	M	M	M	S	S	S	M	M	S

S – Strongly Correlating M- Moderately Correlating

PCA20E25	ARTIFICIAL INTELLIGENCE		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K4 –** Analyse **K5 –** Evaluate		
Objectives	1. To understand the AI & Expert Systems. **2.** To learnt the Heuristic techniques and reasoning. 3. To provide the most fundamental knowledge to the students so that they can understand what the AI. 4. To eliminate theoretic proofs and formal notations as far as possible, so that the students can get the full picture of AI easily.		

UNIT-I: INTRODUCTION: AI Problems – AI techniques – Criteria for Success. Problems – Problem spaces, Search: State space search – Production Systems.

UNIT-II: HEURISTIC SEARCH TECHNIQUES: Generate and Test – Hill Climbing – Best – First Means – end analysis. Knowledge representation issues: Representations and mappings – Approaches to knowledge representations – Issues in Knowledge representations – Frame Problem.

UNIT-III: USING PREDICATE LOGIC: Representing Simple facts in logic – Representing Instance and Is a relationships – Computable functions and predicates – Resolution.

UNIT-IV: REPRESENTING KNOWLEDGE USING RULES: Procedural Vs Declarative knowledge – Logic Programming – Forward Vs Backward Reasoning – Matching – control knowledge.

UNIT-V: GAME PLAYING: The minimax search procedure – Expert System – Perception and Action.

TEXT BOOKS:

1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.

REFERENCE BOOKS:

1. Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig.
2. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
3. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 2003.
4. George F. Luger, "Artificial Intelligence-Structures and Strategies For Complex Problem Solving", Pearson Education / PHI, 2002.

COURSE OUTCOMES:

After completion of the course, student shall be able to

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. **K2**

CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. **K4**

CO3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. **K2,K5**

CO4: Demonstrate profciency developing applications in an 'AI language', expert system shell, or data mining tool. **K2**

CO5: Demonstrate profciency in applying scientifc method to models of machine learning. **K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20E25	**BIG DATA ANALYTICS**		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K3 –** Apply **K4 –** Analyse		
Objectives	1. To optimize business decisions and create competitive advantage with Big Data analytics 2. To explore the fundamental concepts of big data analytics and analyze the big data using intelligent techniques. 3. To understand the various search methods and visualization techniques. 4. To understand the applications using Map Reduce Concepts.		

UNIT-I

INTRODUCTION TO BIG DATA : Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.

UNIT-II

MINING DATA STREAMS : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.

UNIT-III

HADOOP: History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce FeaturesHadoop environment.

UNIT-IV

FRAMEWORKS: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.

UNIT-V

PREDICTIVE ANALYTICS- Simple linear regression- Multiple linear regression- Interpretation 5 of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

TEXT BOOKS:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.

2. Tom White “Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.

3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012.

4. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, CUP, 2012.

REFERENCE BOOKS:

1. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley& sons, 2012.
2. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007.
3. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
4. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, "Intelligent Data Mining", Springer, 2007.
5. Arshdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A HandsOn Approach ",VPT, 2016
6. Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons,2014

COURSE OUTCOMES:

After completion of the course, student shall be able to

CO1: Work with big data platform and explore the big data analytics techniques business applications. **K3**

CO2: Design efficient algorithms for mining the data from large volumes. **K3**

CO3: Analyze the HADOOP and Map Reduce technologies associated with big data analytics. **K4**

CO4: Explore on Big Data applications Using Pig and Hive. **K2**

CO5: Understand the fundamentals of various big data analytics techniques. **K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating M- Moderately Correlating

PCA20E25	OBJECT-ORIENTED ANALYSIS AND DESIGN		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K4 –** Analyze **K5 -** Evaluate		
Objectives	1. To understand the Object-based view of Systems 2. To inculcate necessary skills to handle complexity in software design 3. To develop robust object-based models for Systems 4. Ability to analyse and model software specifications.		

UNIT-I

INTRODUCTION TO OBJECT ORIENTED DEVELOPMENT – modeling as a design technique: Modeling – object modeling techniques – object modeling – objects and classes – links and association – advanced link and association concepts – generalization and interface – grouping constructs – a sample object model – advanced object modeling: aggregation – abstract classes – generalization as extension and restriction - multiple inheritance .

UNIT-II

DYNAMIC MODELING: events and states –operations – nested state diagrams – concurrency – advanced dynamic modeling concepts – a sample dynamic model – relation of object and dynamic models – functional modeling – functional models – data flow diagram – specifying operation – constraints.

UNIT-III

ANALYSIS: overview of analysis – problem statement – automated teller machine example – object modeling – dynamic modeling – functional modeling adding operation iterating the analysis.

UNIT-IV

SYSTEM DESIGN: overview of system - breaking a system into subsystems – identifying concurrency – allocating subsystems to process and tasks – management of data stores – handling boundaries conditions – setting trade –off priorities.

UNIT-V

OBJECT DESIGN: overview of object design – combining the three models – designing algorithms – design optimization – implementation of control – adjustment of inheritance – design of association – object representations – physical packaging – documenting design decisions.

TEXT BOOKS:

1. James Rumbaugh Michael Blaha, William Premerlani, Federick Eddy, William Lorensen – Object Oriented Modeling and Design, Prentice-hall of india New Delhi, 2002..

REFERENCE BOOKS:

1. Grady Booch, "Object-Oriented Analysis and Design With Applications", Pearson Education, 3rd edition, 2009.
2. Mahesh P. Matha, "Object-Oriented analysis and Design Using UML", PHI, 3rd reprint, 2012.

COURSE OUTCOMES

After completion of the course, student shall be able to

CO1: Understand the object oriented life cycle, Use-case design, Object Oriented Design process, software quality and usability. **K2**

CO 2: Identify objects, relationships, services and attributes through UML. **K2, K4**

CO 3: Apply UI design concepts in real-time applications. **K4**

CO 4: An ability to apply knowledge of OOPs concepts in Object Oriented Design. **K5**

CO 5: An ability to analyze the case study and apply the UML notations. **K5**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20E25	**CLOUD COMPUTING**		
	Semester II	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K3 –** Apply		
Objectives	1. To understand the principle of cloud virtualization, cloud storage, data management and data visualization. 2. To learn the key dimensions and challenges of Cloud Computing. 3. To facilitate to choose the appropriate technologies, algorithms, and approaches for the related issues. 4. Able to develop and deploy cloud application using popular cloud platforms.		

UNIT-I

INTRODUCTION: Cloud Computing – History – Working of cloud computing – Cloud computing today – Pros and cons of Cloud Computing – Benefits of cloud computing – Non users of Cloud Computing – Developing cloud services – Pros and Cons of Cloud service Development – Types of Cloud Service Development – Discovering Cloud Services development services and tools.

UNIT-II

CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications – Collaborating of Grocery lists – Collaborating on To-Do lists – Collaborating on Household budgets – Collaborating on Contact lists – Communicating across the community – Collaborating on Schedules – Collaborating on group projects and events – Cloud computing for corporation.

UNIT-III

CLOUD SERVICES: Exploring online calendar applications – Exploring online scheduling applications – Exploring online planning and task management –

Collaboration on event management – Collaboration on Contact Management – Collaboration on Project Management – Collaborating on Word Processing and Databases – Storing and Sharing files and other online content.

UNIT-IV

ISSUES IN CLOUD: Federation in cloud – Four levels of federation – Privacy in cloud – Security in Cloud –Software as a security service – Case Study: Aneka – service level agreements Cloud Storage: Over view of cloud storage – Cloud storage providers – Amazon S3 – Cloud file system – Map Reduce – Hadoop

UNIT-V

CLOUD DEPLOYMENT TOOLS: Study of open source cloud platforms – Eucalyptus - Nimbus – Open Nebula

TEXT BOOKS:

1. Michael Miller, "Cloud computing – Web based applications that change the way you work and collaborate online", Pearson Education Inc., 2008
2. John W.Rittinghous, James F.Ransome, "Cloud Computing: Implementation, Management and Security", CRC Press 2010.

REFERENCEBOOKS:

1. Danielle Ruest and Nelson Ruest, "Virtualization: A Beginners's Guide", McGraw Hill,2009.
2. Tom White, "Hadoop: The Definitive Guide", O'RIELLY Media 2009.
3. Rajkumar Buyya, James Broberg, Andrezj Goscinski, "Cloud computing – Principles and Paradigms", John Wiley and Sons, 2011.

COURSE OUTCOMES

After completion of the course, student shall be able to

CO 1: Understand the common terms and definitions of virtualization and cloud computing **K2**

CO 2: Comprehend the technical capabilities and business benefits of virtualization and cloud computing. **K3**

CO 3: Describe the landscape of different types of virtualization **K2**

CO 4: Illustrate how key application features can be delivered more easily on virtual infrastructures. **K2**

CO 5: Familiarize and apply Cloud deployment tools in real time applications **K3**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

ELECTIVE III

PCA20E35	SOFT COMPUTING		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –**Understand **K4 -** Analyse		
Objectives	1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory. 2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective. 3. Have an indepth knowledge about Supervised and Unsupervised Learning Networks 4. To understand the concepts of Fuzzy sets & measures		

UNIT-I: INTRODUCTION: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.

UNIT-II: SUPERVISED LEARNING NETWORKS: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

UNIT-III : **FUZZY SETS:** Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.

UNIT-IV: Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and **FUZZY REASONING:** Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

UNIT-V: GENETIC ALGORITHM: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function –

Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

TEXT BOOK:

1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Wiley India, 2007.

REFERENCE BOOK

1. S. Rajasekaran, G.A.V. Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms", Prentice Hall India, 2004.

COURSE OUTCOMES:

After completion of the course, student shall be able to
CO1: Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory. **K2**
CO2: Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic **K2**
CO3: To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations. **K2**
CO4: Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications. **K2**
CO5: Reveal different applications of these models to solve engineering and other problems. **K4, K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	S
CO3	S	M	M	S	S	M	S	M	S	S
CO4	S	S	M	S	M	M	S	M	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20E35	**DEEP LEARNING TECHNIQUES**		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K4 –** Analyze		
Objectives	1. To acquire knowledge on the basics of neural networks. 2. To implement neural networks using computational tools for variety of problems. 3. To explore various deep learning algorithms. 4. To present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.		

UNIT-I

BASICS OF DEEP LEANING- DEEP LEARNING ARCHITECTURES: CONVOLUTIONAL NEURAL NETWORKS : Neurons in Human Vision-The Shortcomings of Feature Selection-Vanilla Deep Neural Networks Don't Scale-Filters and Feature Maps-Full Description of the Convolutional Layer-Max Pooling-Full Architectural Description of Convolution Networks-Closing the Loop on MNIST with Convolutional Networks-Image Preprocessing Pipelines Enable More Robust Models-Accelerating Training with Batch Normalization-Building a Convolutional Network for CIFAR-10-Visualizing Learning in Convolutional NetworksLeveraging Convolutional Filters to Replicate Artistic Styles-Learning Convolutional Filters for Other Problem Domains-Training algorithms.

UNIT-II

MEMORY AUGMENTED NEURAL NETWORKS : Neural Turing Machines-Attention-Based Memory Access-NTM Memory Addressing Mechanisms-Differentiable Neural Computers-Interference-Free Writing in DNCs-DNC Memory Reuse-Temporal Linking of DNC Writes-Understanding the DNC Read Head-The DNC Controller NetworkVisualizing the DNC in Action-Implementing the DNC in TensorFlow-Teaching a DNC to Read and Comprehend.

UNIT-III

DEEP REINFORCEMENT LEARNING: Deep Reinforcement Learning Masters Atari GamesWhat Is Reinforcement Learning?-Markov Decision Processes (MDP)-Explore Versus Exploit-Policy versus Value Learning-Pole-Cart with Policy Gradients-Q-Learning and Deep Q-Networks-Improving and Moving Beyond DQN.

UNIT-IV

IMPLEMENTING NEURAL NETWORKS IN TENSORFLOW : What Is TensorFlow?-How Does TensorFlow Compare to Alternatives?-Installing TensorFlow-Creating and Manipulating TensorFlow Variables-TensorFlow Operations-Placeholder Tensors-Sessions in TensorFlow-Navigating Variable Scopes and Sharing Variables-Managing Models over the CPU and GPU-Specifying the Logistic Regression Model in TensorFlow-Logging and Training the Logistic Regression Model-Leveraging TensorBoard to Visualize 24 Computation Graphs and Learning-Building a Multilayer Model for MNIST in TensorFlow.

UNIT-V

APPLICATIONS: Deep learning for computer vision, Deep Learning Applications at the Enterprise Scale, Deep Learning Models for Healthcare Applications.

TEXT BOOKS:

1. Nikhil Buduma, Nicholas Locascio, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms”, O'Reilly Media, 2017.

2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, ”Deep Learning (Adaptive Computation and Machine Learning series”, MIT Press, 2017.

REFERENCE BOOKS:

1. I. Goodfellow, Y. Bengio, A. Courville, Deep Learning, MIT Press, 2016.
2. K. P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.

COURSE OUTCOMES:

After completion of the course, student shall be able to

CO1: Develop algorithms simulating human brain. **K4**

CO2: Implement Neural Networks in Tensor Flow for solving problems. **K4**

CO3: Explore the essentials of Deep Learning and Deep Network architectures. **K2**

CO4: Define, train and use a Deep Neural Network for solving real world problems that require artificial Intelligence based solutions. **K2, K4**

CO5: Familiarize the concepts of Neural Networks and Deep Learning with real time applications **K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	S
CO3	S	M	M	S	S	M	S	M	S	S
CO4	S	S	M	S	M	M	S	M	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20E35	**INTERNET OF THINGS**		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K3 –** Apply **K4 –** Analyze		
Objectives	1. In order to gain knowledge on bases of Internet of Things (IoT) 2. To gain knowledge of IoT Architecture, and the Protocols related to IoT; 3. To understand the concept of the Web of Thing 4. To understand the relationship between the IoT and WoT.		

UNIT-I: INTRODUCTION To IoT: Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

UNIT-II: IoT ARCHITECTURE: M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT-III: IoT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security

UNIT-IV: WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT-V: APPLICATIONS: The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource

Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.

REFERENCE BOOKS:

1. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
2. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.
3. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.

COURSE OUTCOMES:

After completion of the course, student shall be able to

CO1: Gain the basic knowledge about IoT and they will be able to use IoT related products in real life. **K2**

CO2: helps to rely less on physical resources and started to do their work smarter. **K3**

CO3: Able to understand the application areas of IOT **K2**

CO4: Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks **K2**

CO5: Able to understand building blocks of Internet of Things and characteristics. **K2,K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	S
CO3	S	M	M	S	S	M	S	M	S	S
CO4	S	S	M	S	M	M	S	M	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20E35	**MOBILE COMPUTING**		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2 –** Understand **K4 –** Analyse **K6 –** Create		
Objectives	1. Understand the basic concepts of mobile computing and its architecture 2. Be familiar with GPRS Technology 3. Aware about the system be exposed to Ad-Hoc networks 4. Gain knowledge about different mobile platforms and application development		

UNIT-I: BASICS OF MOBILE: Mobile device profiles - Middleware and gateways - Wireless Internet - Smart clients - Three-tier Architecture- Design considerations for mobile computing-– Mobility and Location based services.

UNIT-II: MOBILE COMPUTING THROUGH INTERNET: Mobile-enabled Applications - Developing Mobile GUIs – VUIs and Mobile Applications – Characteristics and benefits -Multichannel and Multi modal user interfaces – Synchronization and replication of Mobile Data - SMS architecture – GPRS – Mobile Computing through Telephony.

UNIT-III: MOBILE APPLICATION DEVELOPMENT: Android- wi-fi –GPS – Camera – Movement – orientation - event based programming – iOS/ windows CE - Blackberry – windows phone – M-Commerce- structure – pros & cons – Mobile payment system - J2ME

UNIT-IV: ADHOC WIRELESS NETWORK - Ad Hoc Wireless Network –MAC protocol – Routing protocols - Transport Layer Protocol - QoS – Energy Management – application design – work flow – composing applications – Dynamic linking – Intents and Services – Communication via the web.

UNIT-V

SECURITY AND HACKING: Password security – Network security – web security – Database security **-** Wireless Sensor Network - Architecture and Design – Medium Access Control – Routing – Transport Layer – Energy model.

TEXT BOOKS:

1. Jochen Schiller, Mobile Communications, Second Edition,2012.
2. William Stallings,"Wireless Communications & Networks", Pearson Education, 2009.

REFERENCE BOOKS:

1. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004
2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.
3. Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff,Thomas Schack, "Pervasive Computing", Pearson, 2009.
4. Fei Hu , Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

COURSE OUTCOMES:

After completion of the course, student shall be able to

CO1: Able to explain the basics of mobile computing system	**K2**
CO2: Able to develop mobile application using android	**K4,K6**
CO3: Understand the Mobile Ad hoc networks and its routing	**K2**
CO4: Understand the different types of security features	**K2**
CO5: Aware about the concept of Network Security and Hacking	**K2**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	M	M	M	M	M	M	S	M	M
CO2	S	S	S	M	M	M	S	S	M	S
CO3	S	M	M	S	S	M	S	M	S	S
CO4	S	S	M	S	M	M	S	M	M	M
CO5	M	M	S	S	S	S	M	M	S	S

S – Strongly Correlating **M- Moderately Correlating**

PCA20E35	PYTHON PROGRAMMING		
	Semester III	**Credits:4**	**Hours: 4**
Cognitive Level	**K2:** Understand **K3:** Apply **K4:** Analyse **K6:** Create		
Objectives	1. Master the fundamentals of writing Python scripts 2. Learn core Python scripting elements such as variables and flow control structures 3. Write Python functions to facilitate code reuse 4. Make their code robust by handling errors and exceptions properly		

UNIT-I: INTRODUCTION: history, features, basic syntax, variable and data types, operator, conditional statements (if, if- else, nested if-else), looping (for, while, nested loops), control statements (break, continue, pass), string manipulation (accessing strings, basic operations, string slices, function and methods)

UNIT-II: LISTS: introduction, accessing list, operations, working with lists, function and methods.

TUPLE: Introduction, accessing tuples, operations, working, functions and methods.

UNIT-III: DICTIONARIES: Introduction, accessing values in dictionaries, working with dictionaries, properties, functions

FUNCTIONS: defining a function, calling a function, types of functions, function arguments, anonymous functions, global and local variables

UNIT-IV: MODULES: Importing module, math module, random module, packages, composition.

INPUT-OUTPUT: printing on screen, reading data from keyboard, opening and closing file, reading and writing files, functions.

UNIT-V

EXCEPTION HANDLING: exception, exception handling, except clause, try, finally clause, user defined exceptions

TEXT BOOKS:

1. Zelle, J. M. (2004). Python programming: an introduction to computer science. Franklin, Beedle & Associates, Inc..
2. Barry, P. (2016). Head First Python: A Brain-Friendly Guide. " O'Reilly Media, Inc.".

REFERENCE BOOKS:

1. Matthes, E. (2015). Python crash course: a hands-on, project-based introduction to programming. No Starch Press.

COURSE OUTCOMES

After completion of the course, Student will be able to

CO1: Explain the basic principles of Python programming language **K2**
CO2: Understand and implement modular approach using python **K2 & K3**
CO3: Implement various data structures provided by python library **K3**
CO4: Develop real-world applications using oops, files and exception handling provided by python **K6**
CO5: Make their code robust by handling errors and exceptions properly **K3 & K4**

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	M	M
CO2	S	S	S	M	S	M	S	S	M	M
CO3	M	S	S	S	S	M	M	S	M	S
CO4	M	M	S	S	S	S	S	M	M	S
CO5	M	S	S	M	S	S	S	M	S	S

S – Strongly Correlating M- Moderately Correlating

***