

**PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018
(AUTONOMOUS)**

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

REGULATIONS 2019

(CBCS)

CURRICULUM AND SYLLABUS

V – VI SEMESTER



M.C.A.Programme

(3 Years Duration)

PAAVAI ENGINEERING COLLEGE

(Autonomous)

Vision

To strive to be a globally model Institution all set for taking 'lead-role' in grooming the younger generation socially responsible and professionally competent to face the challenges ahead.

Mission

- To provide goal- oriented, quality – based and value – added education through state – of – the – art technology on a par with international standards.
- To promote nation – building activities in science, technology, humanities and management through research
- To create and sustain a community of learning that sticks on to social, ethical, ecological, cultural and economic upliftment.

PAAVAI ENGINEERING COLLEGE

(Autonomous)

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

Vision

To strive to be globally model institutions all set for taking lead role in grooming the younger generation socially responsible and professionally competent to face the challenges ahead

Mission

- To upgrade the academic activities by continuous improvement in the teaching - learning process with value based education.
- To enhance social responsibilities of the students necessary for successful practice of the profession.
- To facilitate research and industrial interaction.
- To mould the students into competent and creative technocrats to meet the growing global changes and challenges.
- To encourage the students as entrepreneurs and leaders of the society for the betterment of the Country.

Programme Educational Objectives (PEOs)		
Master of Computer Applications Graduates will be able to :		
PEO1	Global Reputation	To create value added, disciplined high profile Master of Computer Applications professionals for successful careers in their related industry that makes them globally reputed.
PEO2	Fundamental Knowledge	To develop the students with a sound foundation in mathematical, scientific and engineering fundamentals necessary to synthesize the technical core concepts focusing on skill development and knowledge up gradation which will lead to technical innovations.
PEO3	Continuous Learning	To practice and demonstrate the ability to use the domain knowledge and expertise through periodic assignments, performances and projects to continuously prove the functionality of Master of computer applications learning in social environmental aspects and to make allowances for further improvements.

Programme Outcomes (POs)		
Master of Computer Applications Graduates will be able to :		
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communications	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)		
PSO1	Core Competencies:	Foundation of Computer System and Software development: Ability to understand the principles and working of computer systems for the development of software solutions
PSO2	Creativity and Design:	Applications of Computing and Research Ability: Ability to use knowledge in various domains to identify research gaps and hence to provide solution with new ideas and innovations.

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(AUTONOMOUS)

MASTER OF COMPUTER APPLICATIONS

REGULATIONS 2019

(CHOICE BASED CREDIT SYSTEM)

CURRICULUM & SYLLABUS

SEMESTER I

S.No.	Category	Course	Course Title	L	T	P	C
Theory							
1	FC	PMA19108	Mathematical Foundation for Computer Applications	3	2	0	4
2	PC	CA19101	Computer Organization	3	0	0	3
3	PC	CA19102	Problem Solving using C Language	3	0	0	3
4	PC	CA19103	Data Structures and Algorithms	3	0	0	3
5	PC	BA19108	Accounts and Financial Management	3	0	0	3
Practical							
6	PC	CA19104	Programming in C Laboratory	0	0	4	2
7	PC	CA19105	Data Structures and Algorithms Laboratory	0	0	4	2
8	PC	CA19106	Office Automation Laboratory	0	0	4	2
TOTAL				15	2	12	22

SEMESTER II

S.No.	Category	Course	Course Title	L	T	P	C
Theory							
1	PC	CA19201	Object Oriented Programming	3	0	0	3
2	PC	CA19202	Database Management Systems	3	0	0	3
3	PC	CA19203	Embedded System	3	0	0	3
4	PC	CA19204	Operating Systems	3	0	0	3
5	PC	CA19205	Computer Graphics and Multimedia	3	0	0	3
Practical							
6	PC	CA19206	Object Oriented Programming Laboratory	0	0	4	2
7	PC	CA19207	DBMS Laboratory	0	0	4	2
8	PC	CA19208	Graphics and Multimedia Laboratory	0	0	4	2
TOTAL				15	0	12	21

SEMESTER III

S.No.	Category	Course	Course Title	L	T	P	C
Theory							
1	FC	PMA19301	Resource Management Techniques	3	2	0	4
2	PC	CA19301	Computer Communication Networks	3	0	0	3
3	PC	CA19302	Object Oriented Software Engineering	3	0	0	3
4	PC	CA19303	Web Technology	3	0	0	3
5	PC	CA19304	Programming in Java	3	0	0	3
Practical							
6	PC	CA19405	Web Programming Laboratory	0	0	4	2
7	PC	CA19306	Programming in Java Laboratory	0	0	4	2
8	HS	PEN19302	Communication and Soft Skills Laboratory	0	0	2	1
TOTAL				15	2	10	21

SEMESTER IV

S.No.	Category	Course	Course Title	L	T	P	C
Theory							
1	PC	CA19401	C# and .NET Framework	3	0	0	3
2	PC	CA19402	Data Mining and Data Warehousing	3	0	0	3
3	PC	CA19403	Python and R Programming	3	0	0	3
4	PC	CA19404	Cloud Computing	3	0	0	3
5	PE	CA1915*	Professional Elective I	3	0	0	3
Practical							
6	PC	CA19405	C# and .NET Programming Laboratory	0	0	4	2
7	PC	CA19406	Python and R Programming Laboratory	0	0	4	2
8	EE	CA19407	Career Development Laboratory	0	0	4	1
TOTAL				15	0	14	20

SEMESTER V

S.No	Category	Course	Course Title	L	T	P	C
Theory							
1	PC	CA19501	Artificial Intelligence	3	0	0	3
2	PC	CA19502	Big Data Analytics	3	0	0	3
3	PC	CA19503	Internet of Things	3	0	0	3
4	PE	CA1925*	Professional Elective II	3	0	0	3
5	PE	CA1935*	Professional Elective III	3	0	0	3
Practical							
6	PC	CA19504	Mobile App Development Laboratory	0	0	4	2
7	PC	CA19505	Hadoop and Big Data Laboratory	0	0	4	2
8	EE	CA19506	Mini Project	0	0	4	2
TOTAL				15	0	12	21

SEMESTER VI

S.No	Category	Course	Course Title	L	T	P	C
1	EE	CA19601	Project Work	0	0	24	12
TOTAL				0	0	24	12

PROFESSIONAL ELECTIVES (PE)

ELECTIVE I

S.No	Category	Course	Course Title	L	T	P	C
1	PE	CA19151	Linux Internals	3	0	0	3
2	PE	CA19152	Information Security	3	0	0	3
3	PE	CA19153	Software Testing and Quality Assurance	3	0	0	3
4	PE	CA19154	Mobile Computing	3	0	0	3

ELECTIVE II

S.No	Category	Course	Course Title	L	T	P	C
1	PE	CA19251	PHP and MySQL	3	0	0	3
2	PE	CA19252	High Performance Computing	3	0	0	3
3	PE	CA19253	Software Project Management	3	0	0	3
4	PE	CA19254	Organizational Behavior	3	0	0	3

ELECTIVE III

S.No	Category	Course	Course Title	L	T	P	C
1	PE	CA19351	Agile Software Engineering	3	0	0	3
2	PE	CA19352	Machine Learning Techniques	3	0	0	3
3	PE	CA19353	Block Chain Technology	3	0	0	3
4	PE	CA19354	Enterprise Resource Planning	3	0	0	3

FOUNDATION COURSE (FC)

S.No	Category	Course	Course Title	L	T	P	C
1	FC	PMA19108	Mathematical Foundation for Computer Applications	3	2	0	4
2	FC	PMA19301	Resource Management Techniques	3	2	0	4
Total				6	4	0	8

PROFESSIONAL CORE (PC)

S.No.	Category	Course	Course Title	L	T	P	C
1	PC	CA19101	Computer Organization	3	0	0	3
2	PC	CA19102	Problem Solving using C Language	3	0	0	3
3	PC	CA19103	Data Structures and Algorithms	3	0	0	3
4	PC	BA19108	Accounts and Financial Management	3	0	0	3
5	PC	CA19104	Programming in C Laboratory	0	0	4	2
6	PC	CA19105	Data Structures and Algorithms Laboratory	0	0	4	2
7	PC	CA19106	Office Automation Laboratory	0	0	4	2
8	PC	CA19201	Object Oriented Programming	3	0	0	3
9	PC	CA19202	Database Management Systems	3	0	0	3
10	PC	CA19203	Embedded System	3	0	0	3
11	PC	CA19204	Operating Systems	3	0	0	3
12	PC	CA19205	Computer Graphics and Multimedia	3	0	0	3
13	PC	CA19206	Object Oriented Programming Laboratory	0	0	4	2
14	PC	CA19207	DBMS Laboratory	0	0	4	2
15	PC	CA19208	Graphics and Multimedia Laboratory	0	0	4	2
16	PC	CA19301	Computer Communication Networks	3	0	0	3
17	PC	CA19302	Object Oriented Software Engineering	3	0	0	3
18	PC	CA19303	Web Technology	3	0	0	3
19	PC	CA19304	Programming in Java	3	0	0	3
20	PC	CA19405	Web Programming Laboratory	0	0	4	2
21	PC	CA19306	Programming in Java Laboratory	0	0	4	2
22	PC	CA19401	C# and .NET Framework	3	0	0	3
23	PC	CA19402	Data Mining and Data Warehousing	3	0	0	3

24	PC	CA19403	Python and R Programming	3	0	0	3
25	PC	CA19404	Cloud Computing	3	0	0	3
26	PC	CA19405	C# and .NET Programming Laboratory	0	0	4	2
27	PC	CA19406	Python and R Programming Laboratory	0	0	4	2
28	PC	CA19501	Artificial Intelligence	3	0	0	3
29	PC	CA19502	Big Data Analytics	3	0	0	3
30	PC	CA19503	Internet of Things	3	0	0	3
31	PC	CA19504	Mobile App Development Laboratory	0	0	4	2
32	PC	CA19505	Hadoop and Big Data Laboratory	0	0	4	2
Total				60	0	48	84

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.No.	Category	Course	Course Title	L	T	P	C
1	EE	CA19407	Career Development Laboratory	0	0	2	1
2	EE	CA19506	Mini Project (Socially Relevant)	0	0	4	2
3	EE	CA19601	Project Work	0	0	24	12
Total				0	0	30	15

HUMANITIES AND SOCIAL SCIENCES (HS)

S.No.	Category	Course	Course Title	L	T	P	C
1	HS	PEN19302	Communication and Soft Skills Laboratory	0	0	2	1
Total				0	0	2	1

COURSE OBJECTIVES

To enable the students to

- know about basic concepts of NLP and Machine Learning
- obtain a thorough knowledge of various knowledge representation schemes
- have an overview of various AI applications
- study about various heuristic and game search algorithms
- know about various expert systems tools and applications

UNIT I INTRODUCTION 9

Introduction to AI applications and AI techniques, Production systems, control strategies, reasoning – forward and backward chaining. Intelligent Agents: Definitions of a rational agent, reflex, model-based, goal-based, and utility-based agents, the environment in which a particular agent operates.

UNIT II SEARCHING TECHNIQUES AND GAME PLAYING 9

Breadth first search, depth first search, iterative deepening, uniform cost search, hill climbing, simulated annealing, genetic algorithm search, heuristic search, Best first search, A* algorithm, AO* algorithm, Minimax and game trees, refining minimax, Alpha – Beta pruning, constraint satisfaction.

UNIT III KNOWLEDGE REPRESENTATION 9

First order predicate calculus, resolution, unification, natural deduction system, refutation, logic programming, PROLOG, semantic networks, frame system, value inheritance, conceptual dependency, Ontologies. Planning: basic representation for planning, symbolic-centralized vs. reactive-distributed, partial order planning algorithm.

UNIT IV MACHINE LEARNING 9

Introduction to different types of learning, Supervised and Unsupervised learning – Reinforcement learning- Basics of Neural network models.

UNIT V APPLICATIONS OF ARTIFICIAL INTELLIGENCE 9

Natural Language Processing, Speech recognition, Computer vision, Expert systems.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- know how to build simple knowledge-based systems
- apply knowledge representation and machine learning
- solve real world problems
- apply artificial intelligence techniques and solve real time applications
- understand the concept of game playing

REFERENCES

1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach (3rd ed.), Pearson Education, 2010.
2. Elaine Rich and Kelvin Knight, Artificial Intelligence, Tata McGraw Hill, 2002.
3. Nils J Nilson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publishers, Inc., San Francisco, California, 2000.
4. R. Akerkar, Introduction to Artificial Intelligence, Prentice-Hall of India, 2005.
5. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India, 2006.

Mapping of Courses Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- identify the Bigdata concept
- understand mining data stream system
- understand the Hadoop concept
- understand usage of file systems
- understand how to build up framework

UNIT I	INTRODUCTION TO BIG DATA	8
Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools		
UNIT II	HADOOP	9
History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics		
UNIT III	MAP REDUCE	10
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 Features		
UNIT IV	HADOOP ENVIRONMENT	9
Setting up a Hadoop Cluster-Cluster specification-Cluster Setup and Installation- Hadoop Configuration- Security in Hadoop- Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud		
UNIT V	FRAMEWORKS	9
Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and Zoo Keeper - IBM Info Sphere Big Insights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications		
TOTAL PERIODS		45

COURSE OUTCOMES

At the end of the course the students would be able to

- identify the need for big data analytics for a domain
- explore Hadoop distributed system and its components
- design applications using Map Reducing Concepts
- install and utilize Hadoop tool
- understanding the Framework applications

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2012.
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", Cambridge University Press, 2012.
5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

WEB LINKS

1. <http://www-01.ibm.com/software/in/data/bigdata/>
2. <https://www.oracle.com/big-data/index.html>
3. <http://www.uncc.edu/sites/ccu.uncc.edu/files/media/files/Stonebreaker-charlotte.ppt>

Mapping of Courses Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week														
COs	Programme Outcomes													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2	-	-	-	-	-	-	-	1	1	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-	-	2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- learn the basic issues, policy and challenges in the Internet
- understand the components and the protocols in Internet
- build a small low cost embedded system with the internet
- understand the various modes of communications with internet
- learn to manage the resources in the Internet

UNIT I INTRODUCTION 9

Definition–phases – Foundations – Policy– Challenges and Issues - identification - security –privacy Components in internet of things: Control Units – Sensors – Communication modules –Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks –Mobile Internet – Wired Communication

UNIT II PROGRAMMING THE MICROCONTROLLER FOR IOT 9

Basics of Sensors and actuators – examples and working principles of sensors and actuators –Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors Communication: Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / ethernet

UNIT III RESOURCE MANAGEMENT IN THE INTERNET OF THINGS 9

Clustering - Software Agents - Data Synchronization - Clustering Principles in an Internet of Things Architecture -The Role of Context- Design Guidelines -Software Agents for Object – Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy- Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production - The Evolution from the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behavior of Objects

UNIT IV BUSINESS MODELS FOR THE INTERNET OF THINGS 9

The Meaning of DiY in the Network Society- Sensor-actuator Technologies and Middleware as a Basis for a DiY Service Creation Framework-Device Integration - Middleware Technologies Needed for a DiY Internet of Things Semantic Interoperability as a Requirement for DiY Creation -Ontology- Value Creation in the Internet of Things -Application of Ontology Engineering in the Internet of Things-Semantic Web-Ontology - The Internet of Things in Context of EURIDICE – Business Impact

UNIT V FROM THE INTERNET OF THINGS TO THE WEB OF THINGS 9

Resource-oriented Architecture and Best Practices-Designing REST ful Smart Things– Webenabling Constrained Devices - The Future Web of Things - Set up cloud environment – send data from microcontroller to cloud – Case studies – Open Source e-Health sensor platform – Be Close Elderly monitoring – Other recent projects.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- identify the components of IOT
- design a portable IOT using appropriate boards
- program the sensors and controller as part of IOT
- develop schemes for the applications of IOT in real time scenarios
- establish the communication to the cloud through wifi/ Bluetooth

REFERENCES

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2012
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011
3. Luigi Atzor et.al, “The Internet of Things: A survey, “, Journal on Networks, Elsevier Publications,October, 2010

Mapping of Courses Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	3	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	1	2	3	2	-	-	-	2	-	-	-	-	2	2
CO5	2	2	1	2	-	-	-	2	-	-	-	3	2	3



COURSE OBJECTIVES

To enable the students to

- understand the platform and tool available for developing mobile application
 - gain the basics about micro browser based applications in Android to access the Internet
1. Add a spinner. When the spinner is selected, there should be three option(e.g., android, java, testing). When you click on each option, it should go to another page containing some other components. Each of these pages should have a “back” button, which on pressing will take you back to the page with the spinner.
 2. Program a calculator.
 3. Add two EditText. When a number is entered in Edit Text 1, the square of that number should be displayed in Edit Text 2 as a separate Activity.
 4. Create applications to include Action Bar, Menus, Dialogs and Notifications in Android.
 5. Create a camera application, where you can click a picture and then save it as the wallpaper.
 6. Create a user login form and registration form. First time users have to register through the registration form and the details should be stored in the database. Then they can login using the login page.
 7. Create an application that works with Android Content Provider, which searches, add, change and remove content of MIME types.
 8. Create a media player, which plays an mp3 song and will record the sound.
 9. Create a thread, which performs a single task, and perform multithreading in Android.
 10. Create Animation apps like a. Bouncing ball b. Moving arrow.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- develop useful mobile applications for the current scenario in mobile computing
- construct applications that use animation, media players, and content providers



Mapping of Courses Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs)													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3

COURSE OBJECTIVES

To enable the students to

- implement Map Reduce programs for Processing BigData
- realize storage of BigData using H base, Mongo DB

Hadoop Programming

Install, configure and run Hadoop and HDFS.

Implement word count / frequency programs using MapReduce.

Implement an MR Program that processes a weather dataset.

R Programming

Implement Linear and Logistic Regression.

Implement SVM / Decision Tree Classification Techniques.

Implement Clustering Techniques.

Visualize data using any Plotting Framework.

Implement an Application that stores BigData in Hbase / MongoDB / Pig using Hadoop / R.

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- Process BigData using Hadoop Framework
- Perform Graphical Data Analysis

Mapping of Courses Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs)													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- Team Project with a maximum of two in a team
- Students shall select a domain and develop an application with social relevance

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the students shall select a domain and develop an application with social relevance
- documentation is to be based on the standards

Mapping of Courses Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs)													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	2	3	-	-	-	2	-	-	-	-	3	2
CO2	2	2	2	2	-	-	-	1	-	-	-	2	2	3



PROFESSIONAL ELECTIVE – II

CA19251

PHP AND MYSQL

3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand the basic programming concepts in PHP
- relate the need of the Arrays and Control Structures
- identify the components beyond the functions and use them in an application
- gain an basic understanding of the file handling of an application
- understand the basic concepts of MySQL Database

UNIT I INTRODUCTION TO PHP 8

Introduction to Open Source Technology –Introduction to PHP –How PHP works – the PHP.ini file – Basic PHP Syntax – PHP Tags – PHP Statements And Whitespace – Comments – PHP for Web Application – Variables – Variables Types –Identifiers – Type Strength – Variable Scope – Superglobal– Constants Variable

UNIT II ARRAYS AND CONTROL STRUCTURE 9

Arrays – Types of Array, Multidimensional array, Variable, Contents, Operator In PHP. If–Else Statement, Nested If Statement, Switch Statement Looping Structure – For Loop, While Loop, Do While Loop, Foreach Loop

UNIT III FUNCTIONS IN PHP 10

Definition and Syntax of Function, User Defined Function, System Defined Function, Parameterized and Non Parameterize Function. Date & Time Function, Hash Function, Mail Function, File Inclusion – Include(), Require(),String Function –Chr(), strlen(), strops(), strcmp().Testing and Manipulation Functions.

UNIT IV FILE HANDLING 9

Login Security Authentication (Users Logins) – Authorization (permissions) – Encryption – Session Cookies PHP Mail, File Handling, File Uploading.

UNIT V MYSQL DATABASE 9

What is Database?, Understanding Tables, Record & Fields, Working with PHP My Admin, SQL Data Types, Creating Database & Tables, Dropping Database & Tables, Adding Fields, Selecting Table, Alerting Fields Properties, SQL Queries.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- describe and Use the features and syntax of programming language PHP
- understand the methods GET and POST
- work html tags and PHP scripts
- retrieve, insert, update, and delete data from the relational database MySQL
- understanding the Framework applications

REFERENCES

1. Leon Atkinson, "Core PHP Programming", Pearson Publishers, Third Edition, 2018.
2. Stever Holzner, "The complete Reference PHP", McGraw Hill, 2018.
3. Tim Converse, Joyce Park, Clark Morgan, "PHP 5.0 and MySQL Bible", John Wiley & Sons, First Edition. .
4. Christopher Scollo, Harish Rawat, Deepak, "Beginning PHP 5.0 Database by Publisher WROX press, 2018.
5. Tim converse, Joyce Park and Clark Morgan, "PHP 5 and MySQL", Bible Wiley

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CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	3	2	3	3	-	-	-	-	-	-	2	2	2
CO3	2	2	3	2	2	-	-	-	-	-	2	1	2	3
CO4	1	3	2	3	-	-	-	2	-	-	-	-	2	2
CO5	1	2	2	2	-	-	-	3	-	-	-	2	1	3



COURSE OBJECTIVES

To enable the students to

- know how modern high performance processors are organized their strengths and weaknesses
- study about the architecture of parallel systems
- gain depth knowledge about the analytical parallel algorithms
- understand the parallel algorithm design
- identify sorting and graph algorithms concepts

UNIT I MODERN PROCESSORS 9

Stored-program computer architecture – General-purpose cache-based microprocessor architecture – Memory hierarchies - Multicore processors - Multithread processors - Vector processors – Basic optimization techniques for serial code - Common sense optimizations - Simple measures – large impact - Role of compilers.

UNIT II PARALLEL COMPUTERS 9

Data access optimization - Balance analysis and light speed estimates - Storage order - Taxonomy of parallel computing paradigms - Shared memory computers - Distributed memory computers - Hierarchical systems – Networks - Basics of parallelization- Parallelism – Parallel scalability

UNIT III INTRODUCTION TO PARALLEL COMPUTING 9

Motivating parallelism - Scope of parallel computing - Parallel programming platforms: Implicit parallelism trends in microprocessor architectures - Limitations-Dichotomy - Physical organizations - Communication costs – Routing mechanisms for interconnected networks- Impact of process.

UNIT IV PRINCIPLES OF PARALLEL ALGORITHM DESIGN 9

Preliminaries - Decomposition techniques - Characteristics of tasks and interactions – Mapping techniques for load balancing-Methods for containing interaction overheads- Parallel algorithm models - Basic Communication operations.

UNIT V SORTING AND GRAPH ALGORITHMS 9

Dense matrix Algorithm: Matrix-vector multiplication - Matrix- matrix multiplication- Issues in sorting on parallel computing - Sorting networks - Bubble sorts and its variants - Quick sort – Graph algorithms – Definition and representation - Prims algorithm - Dijkstra's algorithm - All pairs shortest path - Transitive closure – Connected components.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- apply basic principles and practices of Computer Science and Engineering research
- design a system, component, or process to meet desired needs within realistic constraints
- identify, formulate and solve engineering problems
- analyze algorithms design
- apply sorting and graph concept

REFERENCES

1. Georg Hager and Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers
2. Ananth Grama and George Karypis, Introduction to parallel computing, Addison-Wesley 2009.
3. John Levesque and Gene Wagenbreth, High Performance Computing: Programming and Applications
4. John L. Hennessy and David Patterson, Computer Architecture- A Quantitative Approach, Elsevier, 2012.

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CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- know of how to do project planning for the software process
- learn the cost estimation techniques during the analysis of the project
- understand the quality concepts for ensuring the functionality of the software
- understand the knowledge and skills needed for the construction of highly reliable software project
- understand to create reliable, replicable cost estimation that links to the requirements of project planning and managing

UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS 9

Introduction to Software Project Management: An Overview of Project Planning: Select Project, Identifying Project scope and objectives, infrastructure, project products and Characteristics. Estimate efforts, Identify activity risks, and Allocate resources.

UNIT II SOFTWARE EVALUATION AND COSTING 9

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, Cost - benefit evaluation techniques, Risk Evaluation. Selection of Appropriate Project approach: Choosing Technologies, choice of process models, Structured methods.

UNIT III SOFTWARE ESTIMATION TECHNIQUES 9

Software Effort Estimation: Problems with over and under estimations, Basis of software Estimation, Software estimation techniques, expert Judgment, Estimating by analogy. Activity Planning: Project schedules, projects and activities, sequencing and scheduling Activities, networks planning models, formulating a network model.

UNIT IV RISK MANAGEMENT 9

Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

UNIT V SOFTWARE QUALITY MANAGEMENT 9

TQM, Six Sigma, Software Quality: defining software quality, ISO9126, External Standards, Comparison of Project management software's: dot Project, Launch pad, Open Project. Case study:PRINCE2

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- understand the activities during the project scheduling of any software application
- learn the risk management activities and the resource allocation for the projects
- apply the software estimation and recent quality standards for evaluation of the software projects
- acquire knowledge and skills needed for the construction of highly reliable software project
- create reliable, replicable cost estimation that links to the requirements of project planning

REFERENCES

1. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw- Hill Publications, Fifth Edition 2012.
2. S. A. Kelkar, "Software Project Management" PHI, New Delhi, Third Edition, 2013.
3. Richard H. Thayer "Software Engineering Project Management,": IEEE Computer Society
4. Futrell, "Quality Software Project Management", Pearson Education India, 2012
5. Bob Hughes & Mike Cotterell, "Software Project Management", Tata McGraw- Hill Publications, Fifth Edition 2012.

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CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	3	1	2	1	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3



COURSE OBJECTIVES

To enable the students to

- learn the fundamentals of organizational behavior
- study the indexing mechanisms for personality
- understand the significance of leadership
- learn to concept organizational change
- understand the organizational structure

UNIT I	ORGANISATIONAL BEHAVIOR	9
Management roles–Management skills challenges and opportunities for OB–models of OB foundation of HRM & OB–Historical development of HR & OB–Research foundation of OB Communication–the two way communication		
UNIT II	PERSONALITY	9
Personality determinants–personality attribute that OB–attitude–concept of attitude–type &function of attitude–motivation–theories of motivation - Perception perceptual selectivity–social perception		
UNIT III	LEADERSHIP	9
Leadership theories–conflicts–types of conflict–conflict process–work team–benefit of work team–types of work team–shaping individual to team player & TQM		
UNIT IV	ORGANISATIONAL CHANGE	9
Forces of change–lewin’s three step model to O.C–Work stress and stress management–organizational development–O.D Pros–client–consultant relationship–organizational development intervention–types of intervention		
UNIT V	ORGANISATIONAL STRUCTURE	9
Elements to design an organization structure–Types of organization–line organization function organization–line and staff organization–division organization–matrix organization–virtual organization		
TOTAL PERIODS		45

COURSE OUTCOMES

At the end of the course the students would be able to

- analyze different foundation of HRM
- analyze different personality attributes in OB
- understand leadership quality
- optimize the organizational change
- analyze the organizational structure

REFERENCES

1. Prasad, L. M, "Organizational Behavior", Sultan S. Chand & Co. 5th Revised Edition Reprint 2018.
2. Saiyadain, M. S, "Organizational Behavior", TMH Publisher, 2017.
3. Sekaran & Uma, "Organizational Behavior" Text& Cases, Tata McGraw Hill Public Company Ltd., New Delhi, 2018.
4. Chandan, J. S., "Organizational Behavior", Vikas Publications. 3rd Edition, 2018.
5. Ghanekar, Anjali, "Organizational Behavior", Everest publishing, 2018.

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CO3	2	2	2	2	2	-	-	-	-		3	1	1	3
CO4	2	2	3	3	-	-	-	1	-	-	-	-	2	2
CO5	3	2	2	2	-	-	-	2	-	-	-	1	2	2



PROFESSIONAL ELECTIVE – III

CA19351

AGILE SOFTWARE ENGINEERING

3 0 0 3

COURSE OBJECTIVES

To enable the students to

- provide students with a theoretical as well as practical understanding of agile software
- understanding of software design and a set of software technologies and APIs
- detailed examination and demonstration of Agile development and testing techniques
- benefits and pitfalls of working in an Agile team
- understand Agile development and testing

UNIT I AGILE METHODOLOGY 9

Theories for Agile management – agile software development – traditional model vs. agile model - classification of agile methods – agile manifesto and principles – agile project management – agile team interactions – ethics in agile teams - agility in design, testing – agile documentations – agile drivers, capabilities and values

UNIT II AGILE PROCESSES 9

Lean production - SCRUM, Crystal, Feature Driven Development, Adaptive Software Development, Extreme Programming: Method overview – lifecycle – work products, roles and practices

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT 9

Agile information systems – agile decision making - Earl's schools of KM – institutional knowledge evolution cycle – development, acquisition, refinement, distribution, deployment , leveraging – KM in software engineering – managing software knowledge – challenges of migrating to agile methodologies – agile knowledge sharing – role of story-cards – Story-card Maturity Model (SMM)

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING 9

Impact of agile processes in RE – current agile practices – variance – overview of RE using agile – managing unstable requirements – requirements elicitation – agile requirements abstraction model – requirements management in agile environment, agile requirements prioritization – agile requirements modeling and generation – concurrency in agile requirements generation

UNIT V AGILITY AND QUALITY ASSURANCE 9

Agile product development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile approach to Quality Assurance - Test Driven Development – Agile approach in Global Software Development

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- importance of interacting with business stakeholders in determining the requirements for a software system
- iterative software development processes: how to plan them, how to execute them
- impact of social aspects on software development success
- techniques and tools for improving team collaboration and software quality
- process improvement as an ongoing task for development teams

REFERENCES

1. David J. Anderson; Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003
2. Hazza & Dubinsky, Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer2009, VIII, 296 p.
3. Craig Larman, Agile and Iterative Development: A manager's Guide, Addison-Wesley, 2004.
4. Kevin C.Desouza, Agile information systems: conceptualization, construction, and management, Butterworth- Heinemann, 2007.
5. Chetankumar Patel, MuthuRamachandran, Story Card Maturity Model (SMM): A Process Improvement Framework for Agile Requirements Engineering Practices, Journal of Software, Academy Publishers, Vol 4, No 5 (2009), 422-435, Jul 2009.

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CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- understand the machine learning theory
- implement linear and non-linear learning models
- implement distance-based clustering techniques
- build tree and rule based models
- apply reinforcement learning techniques

UNIT I FOUNDATIONS OF LEARNING 9

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound – approximation generalization tradeoff – bias and variance – learning curve

UNIT II LINEAR MODELS 9

Linear classification – univariate linear regression – multivariate linear regression –beyond regularized regression – Logistic regression – perceptions – multilayer neural networks – learning neural networks structures– support vector machines–soft margin SVM – going linearity – generalization and over fitting – regularization – validation

UNIT III DISTANCE-BASED MODELS 9

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k-d trees –locality sensitive hashing–non-parametric regression ensemble learning – bagging and random forests– boosting – meta learning

UNIT IV TREE AND RULE MODELS 9

Decision trees–learning decision trees–ranking and probability estimation trees–regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first-order rule learning

UNIT V REINFORCEMENT LEARNING 9

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal-difference learning – active reinforcement learning – exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- explain theory underlying machine learning
- construct algorithms to learn linear and non-linear models
- implement data clustering algorithms
- construct algorithms to learn tree and rule-based models
- apply reinforcement learning techniques

REFERENCES

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AML Book Publishers, 2012
2. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press, 2012.

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CO4	2	1	2	2	-	-	-	2	-	-	-	-	3	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- understand the importance of crypto currency and block chain
- describe the steps involved in the crpto currencies
- understand the stages of bitcoin
- know about the purposes of etherum
- know the list of hyper ledger

UNIT I CRYPTOCURRECNY AND BLOCKCHAIN - INTRODUCTION 9

Blockchain- An Introduction, Distinction between databases and blockchain, Distributed ledger. Blockchain ecosystem - Consensus Algorithms & Types, Blockchain structure, Distributed networks- Distributed Applications (DApps) – Web 3.0 - DApps Ecosystems. Working - Permissioned and permission-less Blockchain – Cross Chain Technologies. – IOT & Blockchain - Digital Disruption in Industries – Banking, Insurance, Supply Chain, Governments, IP rights, Creation of trustless Ecosystems – Block chain as a Service – Open Source Block chains

UNIT II CRYPTOCURRENCIES 9

Crypto Currencies - Anonymity and Pseudonymity in Cryptocurrencies - Digital Signatures - Cryptocurrency Hash Codes -Need for Crypto Currencies – Crypto Markets – Explore Crypto Currency Ecosystems - ICOs – Crypto Tokens - Atomic Swaps – Crypto Currency Exchanges – Centralised and Decentralized Crypto exchanges – Regulations on Crypto Currencies & exchanges – Downside of non-regulated currencies – crypto Scams – Exchange hacks

UNIT III BITCOIN 9

Bitcoin – history- Bitcoin- usage, storage, selling, transactions, working- Invalid Transactions- Parameters that invalidate the transactions- Scripting language in Bitcoin- Applications of Bitcoin script- Nodes and network of Bitcoin- Bitcoin ecosystem

UNIT IV ETHEREUM 9

The Ethereum ecosystem, DApps and DAOs - Ethereum working- Solidity- Contract classes, functions, and conditionals- Inheritance & abstract contracts- Libraries- Types & optimization of Ether- Global variables- Debugging- Future of Ethereum- Smart Contracts on Ethereum- different stages of a contract deployment- Viewing Information about blocks in Blockchain- Developing smart contract on private Blockchain- Deploying contract from web and console

UNIT V HYPERLEDGER 9

Hyperledger Architecture- Consensus- Consensus & its interaction with architectural layers- Application programming interface- Application model -Hyperledger frameworks- Hyperledger Fabric -Various ways to create Hyperledger Fabric Blockchain network- Creating and Deploying a business network on Hyperledger Composer Playground- Testing the business network definition- Transferring the commodity between the participants

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- discover the secure and efficient transactions with crypto-currencies
- experiment with cryptocurrency trading and crypto exchanges
- develop private blockchain environment and develop a smart contract on ethereum
- build the hyperledger architecture in the hyperledger
- build the consensus mechanism applied in the hyperledger

REFERENCES

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas M Antonopoulos 2018
2. Ethereum: Blockchains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations- 2016

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CO4	2	1	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	1	2	-	-	-	2	-	-	-	2	2	2



COURSE OBJECTIVES

To enable the students to

- understand the concept of ERP
- comprehend the purpose of Enterprise Systems
- understand the major process of ERP
- cognize the activities in Integration
- identify the key phases in the recent trends of ERP development

UNIT I INTRODUCTION TO ERP 9

ERP essentials – ERP evolution – ERP market – ERP tiers – information systems – Presentation tier – Application tier – database tier.

UNIT II ENTERPRISE SYSTEMS 9

Enterprise systems – stand alone mainframe systems – client server architecture – service oriented architecture – types of enterprise systems – types of data – SAP overview.

UNIT III PROCESS IN ERP 9

Basic Procurement process – physical flow – document flow – information flow – financial impact - role of enterprise systems in the procurement process – fulfillment process – production process.

UNIT IV INTEGRATION 9

Integrated processes – Integrated processes execution – additional intra company processes – extended (intra company) processes.

UNIT V CASE STUDY 9

ERP for construction industry – ERP for a corrugated box manufacturing company – ERP for lens making company–ERP for furniture manufacturing company – ERP for toys manufacturing company - Mc Donald's story – Automobile enterprises.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course the students would be able to

- conceive the basics concepts of ERP
- use Knowledge documentation for Enterprise Systems
- analyze Problem and Process in ERP
- manage Integration of ERP
- acquire knowledge about security issues and services available

REFERENCES

1. Simha R Magal, Jeff Word, "Essentials of Business Processes and Information Systems", Wiley Publications, 2009.
2. Marianne Bradford, "Modern ERP: Select, Implement and use Today's advanced business systems", Second Edition, Lulu Publishers, 2010.
3. JyotindraZaveri, "Enterprise Resource Planning", Second edition, Himalaya Publishing House, 2012.

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CO4	2	1	2	3	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	2	-	-	-	2	-	-	-	3	2	3

