

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

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

REGULATIONS 2019

(CBCS)

CURRICULUM AND SYLLABUS

III – IV 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

- provide the concept and an understanding of basic concepts in Operations Research
- understand the Techniques for Analysis and Modeling in Computer Applications
- understand, develop and solve mathematical model of linear programming problems
- understand, develop and solve mathematical model of Transport and assignment problems
- understand network modeling for planning and scheduling the project activities

UNIT I LINEAR PROGRAMMING MODELS 15

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Variants of Simplex method

UNIT II TRANSPORTATION AND ASSIGNMENT MODELS 15

Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution– optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm –Variants of the Assignment problem

UNIT III INTEGER PROGRAMMING MODELS 15

Formulation – Gomory’s IPP method – Gomory’s mixed integer method – Branch and Bound technique.

UNIT IV SCHEDULING BY PERT AND CPM 15

Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling

UNIT V QUEUEING MODELS 15

Characteristics of Queuing Models – Poisson Queues - $(M / M / 1) : (FIFO / \infty / \infty)$, $(M / M / 1) : (FIFO/ N / \infty)$, $(M / M / C) : (FIFO / \infty / \infty)$, $(M / M / C) : (FIFO / N / \infty)$ models.

TOTAL PERIODS 75

COURSE OUTCOMES

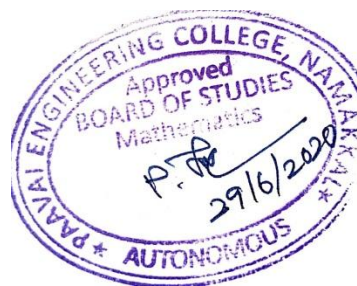
At the end of the course the students would be able

- understand and apply linear, integer programming to solve operational problem with constraints
- apply transportation and assignment models to find optimal solution in warehousing
- prepare project scheduling using PERT and CPM
- identify and analyze appropriate queuing model to reduce the waiting time in queue
- use optimization concepts in real world problems

REFERENCES

1. Taha H.A., "Operations Research : An Introduction" 8th Edition, Pearson Education, 2011.
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2013.
3. Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand& Company Ltd, New Delhi, 3rd Edition,2013.
4. John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods Springer, 2013
5. Ravindran, Phillips, Solberg, "Operations Research: Principles And Practice", 2ndEdition, JohnWiley& Sons, 01-Jul-2012

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	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		2	1	1	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	-	-	-	1	-	-	-	3	2	3



COURSE OBJECTIVES

To enable the students to

- understand networking concepts and basic communication model
- understand network architectures and components required for data communication
- analyze the function and design strategy of physical, data link, network layer and transport layer
- acquire knowledge of various application protocol standard developed for internet
- analyze the trace for the flow of information from one node to another node in the network

UNIT I INTRODUCTION 9

Data Communications – Networks – Protocols and Standards. Network Models – OSI Model – Layers – TCP/IP Protocol Suite–Addressing. Digital Transmission – Digital-to-Digital Conversion – Analog-to-Digital Conversion– Transmission Modes. Analog Transmission – Digital-to-Analog Conversion – Analog-to-analog Conversion- Transmission Media – Guided and Unguided Media.

UNIT II DATA LINK LAYER 9

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control – stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - IEEE 802.4 - IEEE 802.5IEEE 802.11 – FDDI - SONET – Bridges.

UNIT III NETWORK LAYER 9

Internetworks–Circuit Switching- Packet Switching and Datagram approach – IP addressing methods– Subnetting– Routing – Distance Vector Routing – Link State Routing – BGP -Routers.

UNIT IV TRANSPORT LAYER 9

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP)– Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATIONS 9

Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- identify the components required to build different types of networks
- understand the functionalities needed for data communication into layers
- choose the required functionality at each layer for given application
- understand the working principles of various application protocols
- acquire knowledge about security issues and services available

REFERENCES

1. Larry L. Peterson & Bruce S. Davie, “Computer Networks – A systems Approach”, Fourth Edition, Harcourt Asia / Morgan Kaufmann, 2013.
2. William Stallings, “Data and Computer Communications”, Ninth Edition, Prentice Hall, 2013.
3. Forouzan, “ Data Communication and Networking”, Fifth Edition , TMH 2013
4. Andrew S.Tannenbaum David J. Wetherall, “Computer Networks” Fifth Edition , Pearson Education 2013
5. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition,2013

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



COURSE OBJECTIVES

To enable the students to

- understand the phases in a software project and activities in project management
- comprehend the purpose of different UML diagrams
- understand the major considerations in collecting, documenting and analyzing project requirements
- cognize the activities in the crucial phase of system design
- identify the key phases in the recent trends of RUP and agile development

UNIT I	INTRODUCTION	9
Introduction to Software Engineering-Concepts-Software engineering development activities-Managing software development		
UNIT II	MODELING WITH UML	9
UML Diagrams: Use Case Diagrams - Class Diagrams – Interaction Diagrams - State Machine Diagrams - Activity Diagrams. Modeling Concepts - Diagram Organization - Diagram Extension		
UNIT III	REQUIREMENTS AND ANALYSIS	9
Requirements Elicitation - Concepts - Activities & Managing Requirements Elicitation - Analysis: Concepts - Analysis Activities - Analysis Model		
UNIT IV	SYSTEM DESIGN	9
Decomposing the System - Addressing Design Goals - Reusing Patterns - Specifying Interfaces - Mapping Models to Code		
UNIT V	AGILE DEVELOPMENT AND RATIONAL UNIFIED PROCESS	9
Rational Unified Process Key Features - Software Best Practices – Static Structure – Dynamic Structure. Agile Development: Adapting to Scrum - Patterns for Adopting to Scrum - New Roles – Changed Roles – Sprints-Product Backlogs - Teamwork		
TOTAL PERIODS		45

COURSE OUTCOMES

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

- conceive the basics concepts of object oriented software engineering
- use knowledge documentation for object oriented software engineering using UML
- analyze Problem and alternative solutions using object oriented software engineering approach
- manage Software process and build software engineering teams based on engineering approach
- acquire knowledge about security issues and services available

REFERENCES

1. Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering Using UML, Patterns, and Java", 3rd Edition, ISBN-10: 0136061257 | ISBN-13: 978-0136061250, 2010
2. Philippe Kruchten, "The Rational Unified Process: An Introduction", 3rd Edition, ISBN-10: 0321197704, ISBN-13: 978-0321197702
3. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", 1st Edition, ISBN-10: 0321579361 ISBN-13: 9780321579362. 2010.
4. Grady Booch, James Rumbaugh and Ivar Jacobson, "The Unified Modeling Language User Guide", Addison-Wesley Longman, USA, 2nd Edition, ISBN-10: 0321267974, ISBN-13: 9780321267979, 2005.
5. Timothy Lethbridge, Robert Laganier, "Object-Oriented Software Engineering: Practical Software Development using UML and Java", ISBN-10: 0077109082 | ISBN-13: 978-0077109080, 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	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	2	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	3	2	3	-	-	-	-		3	1	2	3
CO4	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	3	1	2	-	-	1	-	-	-	3	1	2



COURSE OBJECTIVES

To enable the students to

- understand the HTML programming
- create and execute advanced dynamic web pages with scripts
- create client side scripting language java script
- understand the basics of XML, JSP programming
- understand the logic behind advanced web applications

UNIT I INTRODUCTION TO HTML 9

Introduction to HTML and HTML5-Formatting and Fonts-Commenting Code- Anchors – Backgrounds – Images- Hyperlinks – Lists – Tables – Frames - HTML Forms.

UNIT II JAVA SCRIPT 9

Core Java Script-Variables-Constant-Expression Conditions-Relational Operators-Data Types- Flow Control-Functions-Objects-Data type Conversation & Equality-Windows and Frames-Forms and Data

UNIT III JDBC & RMI 9

JDBC-Introduction to JDBC and its components – Implementing JDBC in Applet-Introduction to RMI- Structure of RMI – Implementing RMI

UNIT IV XML & SERVLET 9

Servlet Features – 3 Tier Applications – Servlet API – Explaining Servlet Life Cycle – Creating sample Servlet - Working with ServletConfig, Servlet Context, HttpServletRequest and HttpServletResponse – Request Delegation and Request scope

UNIT V JSP 9

Basic JSP Architecture – Life Cycle of JSP – JSP Tags and Expressions – Role of JSP – Scripting elements – Implementation of JSP

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the HTML programming
- create and execute advanced dynamic web pages with scripts
- create client side scripting language java script
- understand the basics of XML, JSP programming
- understand the logic behind advanced web applications

REFERENCES

1. Bayross, "Teach yourself Web Technology part 1 & 2" BPB 2010
2. J.Niederst, "Web Design in a Nuttshell", SPD, 2011
3. A.Subramanyam, "Java Server Programming", SPD, J2EE edition, 2011
4. M.Young, "Step by Step XML", PHI Second Edition, 2012

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



COURSE OBJECTIVES

To enable the students to

- understand an overview of oops concepts
- know the basics of java, AWT and String handling
- understand the knowledge in java spring framework and able to develop programs using it
- develop programs in java and java swings
- understand and practice web development techniques on client-side and server side

UNIT I INTRODUCTION TO JAVA 9

Introduction to java - Features of Java-Object Oriented Concepts – Lexical issues – Data Types – Variables - Arrays – Operators – Control Statements

UNIT II CLASSES, OBJECTS AND METHODS 9

Classes – Objects – Constructors – Overloading Methods – Access Control – Static an Fixed Methods – Inner Class – String Class – Inheritance – Overriding Methods – using Super – Abstract Class

UNIT III PACKAGES 9

Packages – Access Protection – Importing Packing – Interfaces – Exception Handling – Throw and Throws – Thread – Synchronization – Messaging – Runnable Interface – Inter Thread Communication

UNIT III I/O STREAMS 9

I/O Streams – File Streams – String Objects – String Buffer – Char Array – Java Utilities – Random, Vector, Calendar and Properties

UNIT V APPLETT AND AWT 9

AWT package – Layouts – Containers – Event Package – Event Model – Garbage Collection– Multithreading – Language Packages.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- acquire knowledge about the overview on oops concepts
- explore the basics of java, AWT and String handling
- learn and design in java spring framework and able to develop programs using it
- acquire knowledge in java and java swings
- design web development techniques on client-side and server side

REFERENCES

1. Rajkumar Buyya, S.Thamarai Selvi, Xingchen Chu, “Object–Oriented Programming with JAVA: Essentials and Applications”, Fourth Edition, Tata McGraw Hill Education Private Limited, 2013.
2. Herbert Schildt , “ Java: The Complete Reference ”, Ninth Edition, McGraw-Hill, 2014.
3. Felipe Gutierrez, “Introducing Spring Framework: A Primer” Apress, 2014.
4. P.Naughton and H.Schildt, ”Java 2(Complete Reference)” by fourth Edition.
5. Kathy Sierra & Bert Bates, “Head First Servlets &Jsp” by O’Reilly publications.

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



COURSE OBJECTIVES

To enable the students to

- understand and practice the role of language like HTML, XML, Servlet, JSP
- develop and construct web applications with high reliability

1. Prepare a bio data using HTML formatting Tags
2. Prepare Student Mark sheet using Table tags including colspan and rowspan
3. Develop a webpage for Shopping mall using frames and links using HTML
4. Write a program in JavaScript for a simple calculator
5. Software Estimation
6. Software Testing
7. A possible set of applications may be the following
8. Linking the image without clicking using mouseover event in javascript
9. Write a program to change the background of the webpage using javascript
10. Create a program for client and server side program
11. Create a webpage for server side program to find the number of hits.
12. Write a program for html to JSP to generate username and password

TOTAL PERIODS 60

COURSE OUTCOMES

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

- apply software projects into high level design using HTML, CSS
- implement the product and process performance using Servlet, JSP

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	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3



COURSE OBJECTIVES

To enable the students to

- understand and practice basics of java, AWT and String handling
 - understand and practice of exception and multithreading
1. Writing Java programs by making use of class, interface, package, etc for the following
 - a. Different types of inheritance study
 - b. Uses of 'this' keyword
 - c. Polymorphism
 - d. Creation of user specific packages
 - e. User specific exception handling
 2. Write programs in Java for event handling Mouse and Keyboard events.
 3. Write programs in Java to manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using AWT.
 4. Write programs in Java using Layout Manager create different applications
 5. Create an application using Java Applets.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- explore the features and create interactive web pages using them
- acquire knowledge about the exception and thread programs

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	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3



COURSE OBJECTIVES

To enable the students to

- enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises
- enhance the basic communication concepts to enhance the students communication skills through various practice sessions

UNIT I FORMAL & INFORMAL CONVERSATION PRACTICE 6

Role Play1- with family members, neighbours, friends, relatives etc. Simple Expressions – agreeing / disagreeing, persuading, wishing, consoling, advising, arguing, expressing opinions etc - Professional dialogues with the superiors-Conversation with different professionals- Situations like - Government and Corporate Offices, Official Meetings, Educational Institutions, (At the railway junction, malls, post office, bank) etc.

UNIT II ORAL REVIEW, RADIO SHOW & NARRATIVE TECHNIQUES 6

Oral review of movies and discussion or sharing the view on various concepts of the movie, Presentation of various radio programs like news, announcements, advertisements, entertainment programs etc. as a team activity, Understanding the basic narrative techniques-Narrating short stories with message, Narrating real life experiences.

UNIT III RÉSUMÉ / LETTER WRITING 6

Preparation of résumé–structure – use of words and language style – Types of letter – structure of a letter – format for writing letters – use of language in letters

UNIT IV RESENTATION SKILLS&GROUP DISCUSSION 6

Elements of effective presentation – Structure of presentation - Presentation tools – Voice modulation – effective use to presentation tools - Audience analysis - Body language – Video samples- Importance of GD – GD in selection process - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work – Body Language - Mock GD -Video samples

UNIT V INTERVIEW SKILLS 6

Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples.

TOTAL PERIODS 30

COURSE OUTCOMES

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

- speak effectively in English in all occasions
- face the interview process with confidence and perform better

REFERENCES

1. Kalpana. V & Co., “Communication Skills Laboratory Manual”, Vijay Nicole Imprints Pvt. Limited, Chennai. 2013
2. Anderson, P.V. “Technical Communication”, Thomson Edition, New Delhi, 2012.
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi, 2012
4. Kumar Sanjay, PushpLata, “Communication Skills (With CD)”, Oxford University Press, New Delhi. 2011
5. Dutt, Kiranmai P and Geetha Rajeevan, “Basic Communication Skills”, Foundation Books, New Delhi. 2012.

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	2	2	3	-	-	-	-	-	-	2	1	2
CO2	2	2	3	2	3	-	-	-	-		2	1	1	3
CO3	2	2	1	1	2	-	-	1	-	1	1	2	1	2



COURSE OBJECTIVES

To enable the students to

- learn the .NET framework concept and understand the syntax of basic C# Programs
- learn C# elements and OOPS concepts
- learn fundamentals of window application programming and how to create a window applications
- develop web based applications and learn advanced features of C#
- understand the foundation of CLR execution

UNIT I INTRODUCTION TO C# 8

Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations

UNIT II OBJECT ORIENTED ASPECTS OF C# 9

Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.

UNIT III APPLICATION DEVELOPMENT ON .NET 8

Building Windows Applications, IDE, Standard Controls, Application Model, Accessing Data with ADO.NET-ADO .NET Architecture, Automatically generating SQL Statements

UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET 8

Programming Web Applications with Web Forms - ASP.Net, Programming Web Services, Asynchronous Communication

UNIT V THE CLR AND THE .NET FRAMEWORK 12

Assemblies, Versioning, Attributes, Reflection, Viewing MetaData, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- use Visual Studio .NET to implementing the .NET application and to Know the basic C# elements
- know the C# OOPS Concepts
- know the basic ADO.NET structures and Understand the ADO.NET database connectivity
- understand the ASP.NET Programming Model and able to create ASP pages for web applications
- understand the internal functions of CLR and develop Web based applications on .NET CLR

REFERENCES

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2014. (Unit I, II)
2. J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2013. (Unit III, IV, V)
3. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, 2014.
4. Robinson et al, "Professional C#", 2nd ed., Wrox Press, 2013.
5. Andrew Troelsen, "C# and the .NET Platform", A1 Press, 2014.

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	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	2	3	3	1	3	1
CO2	-	-	-	2	3	-	1	2	-	3	3	1	2	2
CO3	-	-	-	-	-	-	-	-	-	3	1	1	2	-
CO4	-	-	-	-	3	1	1	-	2	3	3	1	3	2
CO5	-	-	-	-	-	2	-	2	1	3	1	1	3	2
CO	0	0	0	1	3	1.5	1	2	1.6	3	2.2	1	2.6	1.7



COURSE OBJECTIVES

To enable the students to

- expose the students to the concepts of Data warehousing Architecture and Implementation
- understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- understand the concept of classification for the retrieval purposes
- know the clustering techniques in details for better organization and retrieval of data
- identify Business applications and Trends of Data mining

UNIT I DATA WAREHOUSE 8

Data Warehousing-Operational Database Systems vs. Data Warehouses-Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries& Tools.

UNIT II DATA MINING & DATA PREPROCESSING 9

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Pre-processing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 8

Introduction-Data Mining Functionalities-Association Rule Mining - Mining Frequent Item Sets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT IV CLASSIFICATION & PREDICTION 10

Classification vs. Prediction–Data preparation for Classification and Prediction – Classification by Decision Tree Introduction–Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT V CLUSTERING 10

Cluster Analysis:-Types of Data in Cluster Analysis–A Categorization of Major Clustering Methods– Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understanding the Store voluminous data for online processing
- prepare the Pre-process the data for mining applications
- learn the association rules for mining the data
- practice and deploy appropriate classification techniques
- understand the high dimensional data for better organization of the data

REFERENCES

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2012.
2. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2012.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2013.
4. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2012

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



COURSE OBJECTIVES

To enable the students to

- acquire knowledge in Python and R programming
- develop Python programs with conditionals and loops and data structures
- learn how to design and programs Python applications
- learn how to build and package Python modules for reusability
- understand and practice web development techniques on client-side and server side

UNIT I INTRODUCTION TO PYTHON PROGRAMMING 9

Python interpreter and interactive mode; values and types variables, expressions, statements, tuple assignment, Order of operations, comments, debugging; modules and functions: function Calls, adding new functions, Definitions and Uses, flow of execution, parameters and arguments. Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, range, break, continue, pass; recursion; Strings: string slices, immutability, string and methods, string module; Lists as arrays.

UNIT II LISTS, TUPLES, DICTIONARIES 9

Lists: Traversing a List, list operations, list slices, list methods, Map, Filter and Reduce, list loop, mutability, aliasing, cloning lists, list parameters; Dictionaries: operations and methods; advanced list processing - list comprehension; Tuples: tuple assignment, tuple as return value.

UNIT III FILES, MODULES, PACKAGES: 9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and Exceptions, handling exceptions, modules, packages: PANDAS, NUMPY, SCIKIT-LEARN;

UNIT IV INTRODUCTION TO R PROGRAMMING: 9

Introduction and Preliminaries, numbers and vectors, Objects, their modes and attributes, Ordered and unordered factors, Arrays and matrices, Lists and data frames, Grouping, loops and conditional execution, functions.

UNIT V STATISTICAL MODELS, GRAPHICAL PROCEDURES, PACKAGES 9

Statistical models : Defining statistical models; formulae, Linear models, Generic functions for extracting model information, Analysis of variance and model comparison, Updating fitted models, Generalized linear models, Nonlinear least squares and maximum likelihood models; Graphical procedures: High-level and low-level plotting commands, graphics parameters and list, Dynamic graphics. Packages: Standard packages, Contributed packages and CRAN, Namespaces.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- problem solving and programming capability
- construct and execute basic programs in Python
- use external libraries and packages with Python
- construct and execute basic programs in R using programming techniques
- use external R-packages in statistical and graphics

REFERENCES

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist“, 2nd edition, Updated for Python Shroff/O’Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. William N. Venables, David M. Smith, An Introduction to R: A Programming Environment for Data Analysis and Graphics, 2nd edition, Network Theory Ltd, 2009.
4. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: Interdisciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016. 21

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



COURSE OBJECTIVES

To enable the students to

- introduce the broad perceptive of cloud architecture and model to understand the concept of virtualization and design of cloud Services to be familiar with the lead players in cloud
- understand the features of cloud simulator
- apply different cloud programming model as per need
- design the trusted cloud Computing system
- address the core issues of cloud computing such as security, privacy and interoperability

UNIT I CLOUD ARCHITECTURE AND MODEL 9

Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IAAS,PAAS, SAAS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

UNIT II VIRTUALIZATION 9

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization – Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-centre Automation.

UNIT III CLOUD INFRASTRUCTURE 9

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNIT IV PROGRAMMING MODEL 9

Parallel and Distributed Programming Paradigms – Map Reduce , Twister and Iterative Map Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Aneka, Cloud Sim

UNIT V SECURITY IN THE CLOUD 9

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- compare the strengths and limitations of cloud computing
- identify the architecture, infrastructure and delivery models of cloud computing
- apply suitable virtualization concept
- choose the appropriate cloud player, Programming Models and approach
- design Cloud Services and Set a private cloud

REFERENCES

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management and Security”, CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009.
4. Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India, 2011.
5. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud ”O'Reilly

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



COURSE OBJECTIVES

To enable the students to

- learn the cost estimation techniques during the analysis of the project
 - understand the quality concepts for ensuring the functionality of the software
1. Programs using Branching, Looping.
 2. Programs using Methods, Arrays, Strings.
 3. Programs using Structures, Enumerations.
 4. Programs using Inheritance.
 5. Programs using Polymorphism.
 6. Programs using Interfaces.
 7. Programs using Operator overloading.
 8. Programs using Delegates, Events, Errors and Exceptions.
 9. Program to Build an Calculator widget
 10. Programs Using Multi Module Assembly
 11. Programs using application development on .net.
 12. Programs using Web applications.

TOTAL PERIOD 60

COURSE OUTCOMES

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

- 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

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	2	2	3	-	-	-	-	-	-	2	1	2
CO2	2	2	3	2	3	-	-	-	-		2	1	1	3



COURSE OBJECTIVES

To enable the students to

- understand and practice dynamic scripting on client side Programming
 - understand and practice of Python and R concept
1. Explain and use basic concepts in programming
 2. Use of conditional statements in Python
 3. Use of looping statements in Python
 4. Creating different types of arrays in Python
 5. Usage of array functions in Python
 6. Creating user defined functions in Python
 7. Explain and use basic concepts in R programming
 8. Assign and manipulate data structures using R programming
 9. Create user-defined functions using R programming
 10. Use of looping statements using R programming
 11. Condition statements and debugging using R programming
 12. import/export of data from file using R programming

TOTAL PERIODS 60

COURSE OUTCOMES

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

- explore mark-up languages features and create interactive web pages using them
- acquire knowledge about Open source Python and R libraries

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	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3



UNIT I	CORPORATE READINESS	6
Business Communication–Inter & Intra Personal Skills–Business Etiquettes – Corporate Ethics – Communication Media Etiquette		
UNIT II	INTERVIEW SKILLS	6
Resume Building – Group Discussions – Presentation Skills – Entrepreneur Skills – Psychometric Assessment – Mock Interview		
UNIT III	QUANTITATIVE APTITUDE (QA) 2	6
Profit & Loss–Clock–Power & Square Roots – Train – Boats & Streams – Probability – Calendars – Permutations& Combinations - Partnership – Simplification – Pipes & Cisterns – Puzzles		
UNIT IV	LOGICAL REASONING (LR) 2	6
Statements & Assumptions – Matching Definitions – Logical Games – Making Judgments – Statements &Conclusions – Verbal Classifications		
UNIT V	VERBAL REASONING (VR) 2	6
Syllogisms – Data Sufficiency – Dice – Series Completion – Character Puzzles – Cube & Cuboid – Arithmetic Reasoning		
TOTAL PERIODS		30

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	2	2	-	-	-	2	-	-	-	-	2	2
CO2	1	2	3	1	-	-	-	1	-	-	-	3	2	3



PROFESSIONAL ELECTIVE – I

CA19151

LINUX INTERNALS

3 0 0 3

COURSE OBJECTIVES

To enable the students to

- understand an overview of Linux concepts
- know the basics analysis of buffer cache
- understand the knowledge in system calls
- develop the system process concept
- understand and practice of memory management concept

UNIT I INTRODUCTION 9

General Review of the System-History-System structure-User Perspective-Operating System Services-Assumptions About Hardware. Introduction to the Kernel-Architecture- System Concepts-Data Structures-System Administration.

UNIT II ANALYSIS OF BUFFER CACHE 9

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks - Advantages and Disadvantages Internal Representation of Files-Inodes- Structure-Directories-Path Name to Inode - Super Block-Inode Assignment-Allocation of Disk Blocks -Other File Types

UNIT III SYSTEM CALLS 9

System Calls for the File System-Open-Read-Write-Lseek-Close-Create-Special files Creation -Change Directory and Change Root-Change Owner and Change Mode-Stat- Fstat-Pipes-Dup-Mount-Unmount- Link-Unlink-FileSystem Abstraction-Maintenance.

UNIT IV SYSTEM PROCESSES 9

The System Representation of Processes-States-Transitions-System Memory-Context of a Process-Saving the Context -Manipulation of a Process Address Space-Sleep Process Control-signals-Process Termination-Awaiting-Invoking other Programs-The Shell-System Boot and the INIT Process.

UNIT V MEMORY MANAGEMENT 9

Memory Management Policies-Swapping-Demand Paging-a Hybrid System-I/O- Subsystem-Driver Interfaces-Disk Drivers-Terminal Drivers.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- acquire knowledge about the overview of Linux concepts
- explore the basics of buffer cache concept
- learn and understand the system calls concept
- acquire knowledge in memory management control
- understand the concept of costing

REFERENCES

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education, 2012
2. UreshVahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
3. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
4. Daniel P. Bovet & Marco Cesati, "Understanding the Linux Kernel", O'REILLY, Shroff Publishers & Distributors Pvt. Ltd, 2000
5. M. Beck et al, "Linux Kernel Programming", Pearson Education Asia, 2002

WEB LINKS

1. <http://courses.acs.uwinnipeg.ca/3909-050/lectures/Week01.pdf>
2. <http://handbook.uts.edu.au/subjects/31242.html>
3. <http://studentsblog100.blogspot.in/2015/05/linux-programming-syllabus-5th-sem-cse-reg-2013.html>

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

- understand the basics of cryptography
- learn to find the vulnerabilities in programs and to overcome them,
- know the different kinds of security threats in networks and its solution
- know the different kinds of security threats in databases and solutions available
- learn about the models and standards for security.

UNIT I ELEMENTARY CRYPTOGRAPHY 9

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions– Key Exchange – Digital Signatures – Certificates .

UNIT II PROGRAM SECURITY 9

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Flaws – Common Weakness Enumeration Most Dangerous Software Errors

UNIT III SECURITY IN NETWORKS 9

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec – Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.

UNIT IV SECURITY IN DATABASES 9

Security requirements of database systems – Reliability and Integrity in databases –Redundancy – Recovery – Concurrency/ Consistency – Monitors – Sensitive Data – Types of disclosures – Inference-finding and confirming SQL injection

UNIT V SECURITY MODELS AND STANDARDS 9

Secure SDLC – Secure Application Testing – Security architecture models – Trusted Computing Base – Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCI DSS – Security Standards - ISO 27000 family of standards – NIST.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- apply cryptographic algorithms for encrypting and decryption for secure data transmission
- understand the importance of Digital signature for secure e-documents exchange
- understand the program threats and apply good programming practice
- get the knowledge about the security services available for internet and web applications
- understand data vulnerability and sql injection

REFERENCES

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson 2007. Education,
2. Michael Whitman, Herbert J. Mattord, "Management of Information Security", Third Edition, Course Technology, 2010.
3. William Stallings, "Cryptography and Network Security : Principles and Practices", Fifth Edition, Prentice Hall, 2010.
4. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, McGrawHill Osborne Media, 2009.
5. Matt Bishop, "Computer Security: Art and Science", First Edition, Addison-wesley

WEB LINKS

1. https://www.owasp.org/index.php/Top_10_2010
2. https://www.pcisecuritystandards.org/security_standards/pci_dss.shtml

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	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

- understand an overview of software testing concepts
- know the basics analysis of quality assurance
- understand the knowledge in activity planning
- develop the risk management concept
- understand and practice of software quality assurance

UNIT I INTRODUCTION 9

Software Projects various other types of projects - Problems with software projects - an overview of project-planning - Project evaluation - Project Analysis and technical planning - Project estimates - Preparation of Estimates - COCOMO model - Function Point Analysis - Putnam Model - Non-development overheads.

UNIT II ACTIVITY PLANNING 9

Project schedules - Sequencing and scheduling projects - Network planning models - Shortening project duration Identifying critical activities.

UNIT III RISK MANAGEMENT 9

Resource allocation - Monitoring and Control - Managing people and organizing teams - Planning for small projects- Handling large projects - Divide and Conquer - Software Project survival.

UNIT IV SOFTWARE CONFIGURATION MANAGEMENT 9

Basic functions, responsibilities, standards, configuration Management, Prototyping - Models of prototyping.

UNIT V SOFTWARE QUALITY ASSURANCE 9

Quality and the quality system - standards and procedures - Technical activities – components - Continuous Improvement - Software Tasks - Management responsibility - Quality System - Contract Review – Document Control - Product identification and trace ability.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- acquire knowledge about the overview of software testing concepts
- explore the basics activity planning concept
- learn and understand the risk management concept
- acquire knowledge in software configuration management control
- understand the software quality assurance

REFERENCES

1. Mike Cotterell and Bob Hughes, "Software Project Management - Inclination", Tata McGraw Hill, 2006.
2. Robert K. Wysocki, Robert Beck Jr and David B. Crane, "Effective Project Management", John Wiley & Sons Inc, 2002.
3. Steve McConnell, "Software Project Survival Guide", Microsoft Press, 2000
4. Gerald M. Weinberg," Quality Software Management", Volume I, Systems Thinking, Dorset House Publishing, 2002
5. Gerald M. Weinberg," Quality Software Management", Volume II, First Order Measurement, Dorset House Publishing, 2002.

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



COURSE OBJECTIVES

To enable the students to

- learn the basic concepts, aware of the GSM, SMS, GPRS Architecture
- have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBeeissues
- know the Network, Transport Functionalities of Mobile communication
- impart knowledge about Mobile Application Development Platform
- impart the knowledge about basic components needed for Mobile App development

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS, ARCHITECTURE 9

Frequency Spectrum- Multiplexing- Spread spectrum-GSM vs CDMA - -Comparison of 2G , 3 G, 4G - GSM Architecture-Entities-Call Routing- Address and identifiers- GSM Protocol architecture-Mobility Management-Frequency Allocation- Security –GPRS Architecture (entity and Protocol).

UNIT II MOBILE WIRELESS SHORT RANGE NETWORKS 9

Introduction-WLAN Equipment-WLAN Topologies-WLAN Technologies-IEEE 802.11 Architecture-WLAN MAC-Security of WLAN, Power Management-Standards- WAP Architecture- Bluetooth enabled Devices Network-Layers in Bluetooth Protocol-Security in Bluetooth- IrDA- ZigBee.

UNIT III MOBILE IP NETWORK LAYER, TRANSPORT LAYER 9

IP and Mobile IP Network Layer- Packet delivery and Handover Management-Location Management-Registration- Tunneling and Encapsulation-Route Optimization- Mobile Transport Layer-Conventional TCP/IP Transport Layer Protocol-Indirect, Snooping, Mobile TCP.

UNIT IV MOBILE APPLICATION DEVELOPMENT USING ANDROID 9

Mobile Applications Development - Understanding the Android Software Stack – Android Application Architecture –The Android Application Life Cycle – The Activity Life Cycle- Creating Android Activity -Views-Layout -Creating User Interfaces with basic views- linking activities with Intents.

UNIT V MOBILE APPLICATION DEVELOPMENT USING ANDROID 9

Services-Broadcast Receivers – Adapters – Data Storage, Retrieval and Sharing.-Location based services-Development of simple mobile applications

TOTAL PERIODS 45

COURSE OUTCOMES

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

- gain the knowledge about various types of Wireless Data Networks and Voice Networks
- understand the architectures, the challenges and the Solutions of Wireless Communication
- realize the role of Wireless Protocols in shaping the future Internet
- able to develop simple Mobile Application Using Android

REFERENCES

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal “Mobile Computing”, Tata McGraw Hill Pub ,2nd Edition Aug – 2010.
2. Barry A. Burd , “Android Application Development For Dummies All in One”, Wiley, 2015.
3. Ed Burnette, “Hello, Android: Introducing Google’s Mobile Development Platform” third edition” Pragmatic Programmers,2012.
4. JochenSchillar “Mobile Communications” Pearson Education second Edition.
5. Jerome(J.F) DiMarzio “Android A programmer’s Guide” Tata McGraw-Hill 2010 Edition

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(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Week														
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CO1	2	2	3	2	-	-	-	-	-	-	-	1	2	2
CO2	1	2	2	2	3	-	-	-	-	-	-	2	1	2
CO3	2	2	2	2	2	-	-	-	-		2	1	1	3
CO4	2	2	3	2	-	-	-	2	-	-	-	-	2	2
CO5	1	2	2	1	-	-	-	1	-	-	-	3	2	3

