



Ready for
Every Good Work

SACRED HEART COLLEGE (AUTONOMOUS)

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A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Sacred Heart College (Autonomous), Tirupattur District

1.2.1 List of New Courses

M.Sc Computer Science

Sem	Code	Subject	L	T	P	C	CA	Sem	Total
I		Principles of Compiler Design	4	0	0	3	50	50	100
		Advanced Java Programming	4	1	0	3	50	50	100
		Desktop Applications	4	1	0	3	50	50	100
		Open Source Technologies	3	1	0	3	50	50	100
		Elective-I: a. Web Services b. Data Mining and Warehousing c. Business Intelligence	4	0	0	3	50	50	100
		Practical – I: Advanced Java Programming	0	0	2	2	50	50	100
		Practical –II : Desktop Applications	0	0	2	2	50	50	100
		Practical – III: Open Source Technologies	0	0	2	2	50	50	100
		Employability Skills	2	0	0	0	100	-	100
		MOOCs	-	-	-	2[#]	-	-	-
	Total	21	3	6	21+2[#]	-	-	30	
II		Distributed Operating System	4	0	0	3	50	50	100
		Enterprise Java Programming	4	1	0	3	50	50	100
		Web Applications	4	1	0	3	50	50	100
		Programming in Python	3	1	0	3	50	50	100
		Elective-II: a. Object Oriented Analysis and Design b. Software Testing and Quality Assurance c. Wireless Sensor Networks	4	0	0	3	50	50	100
		Practical - IV: Enterprise Java Programming	0	0	2	2	50	50	100
		Practical - V: Web Applications	0	0	2	2	50	50	100
		Practical -VI: Programming in Python	0	0	2	2	50	50	100
		Technical Aptitude	2	0	0	-	100	-	100
		Skill Empowerment – I	0	0	0	1	100	-	100
		Department Domain – I (30 Hrs) / MOOCs	-	-	-	2*	-	-	-
		Total	21	3	6	22+2*	-	-	30

III	Internet Of Things	4	0	0	3	50	50	100
	Artificial Intelligence	4	0	0	3	50	50	100
	Design and Analysis of Algorithms	4	1	0	3	50	50	100
	Mobile Applications	4	1	0	3	50	50	100
	Elective - III:					50	50	
	a. Semantic Web and Applications							
	b. Ethical Hacking & Cyber Forensics	4	0	0	3			100
	c. Cloud Computing							
	Practical-VII: Design and Analysis of Algorithms	0	0	2	2	50	50	100
	Practical – VIII: Mobile Applications	0	0	2	2	50	50	100
	Software Project – I	0	0	2	2	50	50	100
	Career Building Skills	2	0	0	-	100	-	100
	Industrial Plant Training	0	0	0	2	100	-	100
Skill Empowerment – II	0	0	0	1	100	-	100	
MOOCs	-	-	-	2*	-	-	-	
Total	22	2	6	24+2*	-	-	30	
IV	Big Data Analytics	4	-	0	3	50	50	100
	Data Science with Python	4	1		3	50	50	100
	Machine Learning	4	1	0	3	50	50	100
	Elective-IV:					50	50	
	a. Cryptography and Network Security							
	b. Social Network Analysis	4	0	0	3			100
	c. Soft Computing							
	Practical - IX: Data Science with Python	0	0	2	2	50	50	100
	Practical - X: Machine Learning	0	0	2	2	50	50	100
	Software Project – II	0	0	4	3	50	50	100
	Human Rights	2	0	0	2	50	50	100
	Research Investigation	2	0	0	1	100	-	100
	Skill Empowerment – III	0	0	0	1	100	-	100
Department Domain – II(30 Hrs)	-	-	-	2[#]	-	-	-	
Total	20	2	8	23+2[#]	-	-	30	
Grand Total	84	10	26	90+4[#]+4*	-	-	120	

M.Sc., Computer Science 2021-2022 New Course Syllabus Content

S.NO	COURSE TITLE
1.	Internet of Things
2.	Artificial Intelligence
3.	Design and Analysis of Algorithms
4.	Mobile Applications
5.	Semantic Web and Applications
6.	Ethical Hacking and Cyber Forensics
7.	Cloud Computing
8.	Practical: Design and Analysis of Algorithms
9.	Practical: Mobile Applications
10.	Career Building Skills
11.	Big Data Analytics
12.	Data Science with Python
13.	Machine Learning
14.	Cryptography and Network Security
15.	Social Network Analysis
16.	Soft Computing
17.	Practical: Data Science with Python
18.	Practical: Machine Learning
19.	Research Investigation

INTERNET OF THINGS

LEARNING OBJECTIVES

- To introduce the IoT and its baseline technologies.
- To explore the IOT and M2M and its Connectivity technologies.
- To understand the contribution of WSN and other networks towards IOT.
- To implement the IOT applications using Arduino and Raspberry Pi.
- To know the importance of SDN, Sensor cloud and Fog computing.

UNIT – I: INTRODUCTION TO INTERNET OF THINGS

Definition & Characteristics of IoT , Applications of IOT, IOT categories, enablers and connectivity layers, Baseline technologies, Sensors, Actuators, IOT components and implementation, Challenges for IOT; Physical Design of IoT - Things in IoT , IoT Protocols; Logical Design of IoT -IoT Functional Blocks, IoT Communication Models, IoT Communication APIs;IoT Enabling Technologies.

UNIT - II: IOT NETWORKING & CONNECTIVITY TECHNOLOGIES

IOT Networking : Connectivity terminologies – Gateway allotment- IOT identification and data protocols ; Connectivity Technologies

UNIT - III: WIRELESS SENSOR NETWORKS Wireless Sensor Network (WSN): Components of Sensor Node, Modes of Detection and Challenges, Sensor web, Behavior of nodes in WSN, Applications of WSN.

UNIT - IV: IOT PLATFORMS DESIGN METHODOLOGY AND IOT PHYSICAL DEVICES & IMPLEMENTATION

IoT Design Methodology-steps - Case Study on needs and implementation of IoT Smart Applications - Introduction to Arduino Board and Types of Arduino Boards. Introduction to Arduino IDE, Architecture of Arduino Board, Programming Arduino Board and Running the coding in Arduino Board – Implementing the IoT Projects.

UNIT – V: SOFTWARE DEFINED NETWORK AND SENSOR CLOUD

SDN: Introduction – Architecture of SDN, Rule placement, Openflow protocol, Controller, SDN in IOT- Software defined WSN – SDN for mobile networking and Access Devices; Sensor Cloud: Architecture, Life cycle, layered structure and Applications- Issues and challenges in Sensor Cloud.

TEXT BOOKS

1. Jeeva Jose, “Internet of Things”, Kanna publishing, 2018.
2. Vijay Madiseti and ArshdeepBahga, “Internet of Things (A Hands-on Approach)”, 1stEdition, VPT, 2014.

REFERENCES

1. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013

2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

WEB REFERENCES

www.ibm.com › Learn › Internet of Things
<https://thingspeak.com/>
<https://yourstory.com/2015/03/internet-of-things-application/>
<https://create.arduino.cc/iot/>
<https://www.carriots.com/tutorials>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Able to understand the basics of IoT and its baseline technologies.
- Recognize about IOT and M2M and its Connectivity technologies.
- Be familiar with the WSN and other networks in IOT.
- Capable of developing the simple IOT applications using Arduino and Raspberry Pi.
- Make out the importance of SDN, Sensor cloud and Fog computing.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

ARTIFICIAL INTELLIGENCE

LEARNING OBJECTIVES

- To provide a strong foundation of fundamental concepts in Artificial Intelligence
- To provide a basic exposition to the goals and methods of Artificial Intelligence
- To enable the student to apply these techniques in applications which involve perception, reasoning and learning
- To introduce the concept of expert systems
- To impart knowledge about neural networks

UNIT – I: OVERVIEW OF ARTIFICIAL INTELLIGENCE

Introduction- Definition- Why AI- Difference between symbolic and non-symbolic representation- History of AI- Turing Test- Chinese Room Test- Applications- Objectives of AI- Artificial Intelligence Programming- Criticism of AI- Future of AI..

UNIT – II: KNOWLEDGE REPRESENTATION AND REASONING SYSTEMS

Knowledge Engineering- Procedure for Knowledge Acquisition- Knowledge Representation-Logical- Procedural- Network- Structured- Reasoning- KRR Systems- KR languages- Domain Modelling- Semantic Nets- Frame Based Systems- Hybrid Representation Systems.

UNIT – III: UNCERTAINTY

Uncertainty: Non-monotonic and monotonic reasoning- confidence factor- Bayes theorem- Bayesian Networks-Fuzzy Logic- Computer vision- NLP- Speech Recognition.

UNIT – IV: EXPERT SYSTEMS

Introduction- Skill vs Knowledge- Characteristics of expert system- history- knowledge engineering- inferencing- Expert system-tools- Applications.

UNIT – V: NEURAL NETWORKS

Difference between human and machine intelligence- features of biological neural networks- human brain learns- human neurons to artificial neurons- neural networks learn- learning algorithms- network architectures and their applications- comparisons of neural networks- rule-based methods-expert systems- benefits of neural network-limitations.

TEXT BOOK

1. RajendraAkerkar, “Introduction to Artificial Intelligence”, Prentice Hall of India, 2008.

REFERENCES

1. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, “Artificial Intelligence-Structures and Strategies For Complex Problem Solving”, Pearson Education / PHI, 2002.

WEB REFERENCES

https://www.tutorialspoint.com/artificial_intelligence/
<https://learn.saylor.org/course/view.php?id=96>
<https://in.udacity.com/course/intro-to-artificial-intelligence--cs271>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
- Apply these techniques in applications which involve perception, reasoning and learning.
- Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
- Acquire the knowledge of real world Knowledge representation.
- Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
- Use different machine learning techniques to design AI machine and enveloping applications for real world problems

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

Semester - III

4-1-0:3:50:50

DESIGN AND ANALYSIS OF ALGORITHMS

LEARNING OBJECTIVES

- To prove the correctness and analyze the running time of the basic algorithms for those classic problems.
- To understand the basic knowledge of algorithm design and its implementation.
- To learn the key techniques of Divide-and-Conquer and Greedy Method.
- To recognize the concept of Dynamic Programming and its algorithms
- To familiarize with Backtracking algorithms.
- To understand Branch and Bound techniques for designing and analyzing algorithms.

UNIT - I: INTRODUCTION

Algorithm Specification-Performance Analysis: Space complexity- Time Complexity-Asymptotic notations-practical complexities-performance measurement- Randomized algorithms: An informal Description- Identifying the repeated element- Primality testing- Advantages and Disadvantages.

UNIT - II: DIVIDE-AND-CONQUER AND GREEDY METHOD

Divide-and-conquer: General method-Binary Search-Finding the maximum and minimum-Merge sort-quick sort- Strassen's Matrix multiplication- The greedy Method: The general method-Knapsack problem-Minimum cost spanning tree

UNIT - III: DYNAMIC PROGRAMMING

Dynamic Programming: Dynamic programming- All pairs shortest paths- Single source shortest paths-String editing- 0/1 knapsack- The traveling salesperson problem-Flow shop scheduling

UNIT - IV: BACKTRACKING

Backtracking: General Method-8 queen's problem- Sum of subsets- Graph coloring-Hamiltonian cycles-Knapsack Problem

UNIT - V: BRANCH AND BOUND

Branch-and-Bound: General method of algebraic problem-Modular arithmetic- Comparison trees-Lower bound through reduction-Planar graph coloring problem-Bin packing.

TEXT BOOK

1. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications Pvt.Ltd, 2005

REFERENCES

1. S.K.Basu, "Design Methods and Analysis of Algorithms", Fourth edition, 2010
2. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education Asia, Addison-Wesley Publishing Company, 2003
3. AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, Dorling Kindersley India Pvt.Ltd, 2003

WEB REFERENCES

<http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html>

<http://cs.uef.fi/pages/franti/asa/notes.html>

<http://computerstuff7090.blogspot.in/2012/11/design-analysis-and-algorithm-video.html>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Prove the correctness and analyze the running time of the basic algorithms for those classic problems.
- Understand the basic knowledge of algorithm design and its implementation.
- Learn the key techniques of Divide-and-Conquer and Greedy Method.
- Recognize the concept of Dynamic Programming and its algorithms
- Familiarize with Backtracking algorithms.
- Understand Branch and Bound techniques for designing and analyzing algorithms.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	ANY THREE	15	Theory	Theory or Program	Program	Program	Theory or Program	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

MOBILE APPLICATIONS

LEARNING OBJECTIVES

- To know the basis of Android application and development environment
- To able to develop simple and professional application
- To know the different controls in Android
- To impart knowledge about handling pictures and menus
- To get ready for the job opportunity in mobile application development

UNIT - I: INTRODUCTION TO ANDROID

History of Android Platform- Android APIs- Android Architecture Application Framework- Features of Android- Android Applications- Application Components - Manifest File- Downloading and Installing Android and Android SDK - Setting up Android Virtual and physical Device - Exploring the Development Environment - The Java Perspective Using Eclipse - DDMS Perspective - Command-Line Tools- Developing and Executing the First Android Application - Using Eclipse IDE to Create an Application - Running Your Application - Exploring the Application - Using Command - Line Tools.

UNIT – II: ACTIVITIES, INTENTS AND FRAGMENTS

Working with Activities- Creating an Activity- Starting an Activity – Managing the Life cycle of an Activity - Applying Themes and Styles to an Activity- Displaying a Dialog in the Activity - Hiding the title of the activity- Using Intents-Exploring Intent Objects- Exploring Intent Resolution- Exploring Intent Filters - Resolving Intent Filter Collision - Linking the Activities Using Intent - Obtaining Results from Intent – Passing Data Using an Intent Object- Fragments - Hiding Title Bar and Screen Orientation - Fragment Implementation - Finding Fragments - Adding, Removing and Replacing Fragments - Finding Activity Using Fragment - Using the Intent Object to Invoke Built-in Application..

UNIT - III: UI USING VIEWS AND VIEW - GROUPS

Working with View Groups – Linear Layout – Relative Layout – Scroll Layout – Table Layout – Frame Layout – Tab Layout using the Action Bar – Working with Views – Text – Edit Text – Button – Radio Button – Check Box – Image Button – Toggle Button – Rating Bar – Binding Data with Adapter View Class – List View – Spinner – Gallery – Designing the Auto Text Complete View – Screen Orientation – Anchoring the Views of Current Activity – Handling UI Events – Handling User Interaction with Activities and Views – Specialized Fragments – List Fragment – Dialog Fragment – Preference Fragment – Creating Menus, Option Menus, Context Menu and Sub Menu.

UNIT - IV: HANDLING PICTURES AND MENUS WITH VIEWS AND STROING THE DATA

Working with Image Views – Displaying Images in the Gallery View – Displaying Images in the Grid View – Using the Image Switcher View- Designing Context Menu for Image View- Using the Analog-Clock and Digital Clock Views – Embedding Web Browser in an Activity - Notifying the User Creating the Toast Notification - Creating the Status Bar Notification- Creating the Dialog Notification - Introducing the Data Storage Options - Using Preferences - Using the SQLite Database Creating the Database - Executing the Database Operations.

UNIT - V: EMAILING, TELEPHONY AND SMS IN ANDROID

Building an Application to Send Email - Handling Telephony - Displaying Phone InformationApplication Receiving Phone Calls – Making Outgoing Phone Calls Application - Handling SMS Sending SMS Using SMS Manager - Sending SMS Using Intent - Receiving SMS Using the

Broadcast Receiver Object- Role of Default SMS Providers - . Publishing Android Application: Export android application – Google play store registration.

Supplementary Learning: Building Mobile Applications using Xamarin

TEXT BOOKS

1. Pradeep Kothari, “Android Application Development (with kitkat support) Black Book”, Kogent Learning Solution Inc., Dreamtech Press India Pvt. Ltd, Wiley Publications.
2. Sayed Y. Hashimi, SatyaKomatineni, Dave MacLean, “Pro Android 2”, 2010 Edition, Wiley publications.

REFERENCES

1. Reto Meier ,”Professional Android Application Development”,2009 Edition, Willy Publication.
2. ZigurdMednieks, Laird Dornin, G. Blake Meike,and Masumi Nakamura, “Programming Android”, OReilly publications.

WEB REFERENCES

www.tutorialspoint.com
www.javatpoint.net
www.mkyong.com
www.java2s.com

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Know about the mobile application development environment
- Develop interface and design
- Use the techniques in Mobile Applications
- Develop a simple as well as a professional application
- Be ready for the job opportunity in mobile application development

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	Theory or	Theory or	Theory or	Program or	Program or	5 Pairs

			Theory	Program	Program	Program	Program	
C	ANY THREE	15	Theory	Theory or Program	Program	Program	Theory or Program	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

Semester - III

4-0-0:3:50:50

ELECTIVE - III: A. SEMANTIC WEB AND APPLICATIONS

COURSE OBJECTIVES:

- To learn the fundamentals of semantic web and to conceptualize and depict ontology for semantic web.
- To make a study of languages for semantic web.
- To learn about the ontology learning algorithms and to utilize in the development of an application.
- To know the fundamental concepts of ontology management.
- To learn the applications related to semantic web.

UNIT I THE QUEST FOR SEMANTICS

Building Models – Calculating with Knowledge – Exchanging Information – Semantic Web Technologies – Layers – Architecture – Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background – Sample Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation.

UNIT II LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES 9

Web Documents in XML – RDF – Schema – Web Resource Description using RDF – RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics – Traditional Ontology Languages – LOOM – OKBC – OCML – FLogic Ontology Markup Languages – SHOE – OIL – DAML + OIL – OWL.

UNIT III ONTOLOGY LEARNING FOR SEMANTIC WEB

Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms – Methods for Evaluating Ontologies.

UNIT IV ONTOLOGY MANAGEMENT AND TOOLS

Overview – Need for Management – Development Process – Target Ontology – Ontology Mapping – Skills Management System – Ontological Class – Constraints – Issues, Evolution – Development Of Tools And Tool Suites – Ontology Merge Tools – Ontology Based Annotation Tools.

UNIT V APPLICATIONS

Web Services – Semantic Web Services – Case Study for Specific Domain – Security Issues – Web Data Exchange and Syndication - Semantic Wikis – Semantic Portals – Semantic Metadata in Data Formats – Semantic Web in Life Sciences – Ontologies for Standardizations – Rule Interchange Format.

REFERENCES:

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, “Foundations of Semantic Web Technologies”, Chapman & Hall/CRC, 2009.
2. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez “Ontological Engineering: with Examples from the Areas of Knowledge Management, E-Commerce and the Semantic Web”, Springer, 2004.
3. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer (Cooperative Information Systems)”, The MIT Press, 2004.
4. Alexander Maedche, “Ontology Learning for the Semantic Web”, Springer, 2002.
5. John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology – Driven Knowledge Management”, John Wiley, 2003.
6. John Davies, Rudi Studer, Paul Warren, “Semantic Web Technologies: Trends and Research in Ontology-based Systems”, Wiley, 2006.

WEB REFERENCES

LEARNING OUTCOMES:

On successful completion of the course students will be able to:

- Create ontology for a given domain.
- Develop an application using ontology languages and tools.
- Understand the concepts of semantic web.
- Use ontology related tools and technologies for application creation.
- Design and develop applications using semantic web.
- Understand the standards related to semantic web.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

ELECTIVE – III: B. ETHICAL HACKING & CYBER FORENSICS

COURSE OBJECTIVES

- To understand the hacking techniques of computer forensics.
- To learn about data recovery methods.
- To know about threats and vulnerabilities
- To identify the threats in computer forensics.
- To get knowledge on data recovery

UNIT I ETHICAL HACKING

Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications.

UNIT II TYPES OF COMPUTER FORENSICS

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

UNIT III DATA RECOVERY

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

UNIT IV ELECTRONIC EVIDENCE

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

UNIT V THREATS

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

REFERENCE BOOKS:

1. John R. Vacca, “Computer Forensics”, Firewall Media, 2004.
2. Kevin Beaver, “Hacking For Dummies”, John Wiley & Sons,2012.
3. Chad Steel, “Windows Forensics”, Wiley India, 2006.
4. Majid Yar, “Cybercrime and Society”, Sage Publications, 2006.
5. Robert M Slade, “Software Forensics”, Tata McGrawHill, 2004.

WEB REFERENCES

<https://tell.colvee.org/course/view.php?id=14>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Able to distinguish between hackers and normal users.
- To apply the principles of computer forensics for security.
- To implement the data recovery methods.
- To manage threats and the tactics.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

ELECTIVE – III: C. CLOUD COMPUTING

LEARNING OBJECTIVES

- To introduce the broad perspective 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.
- To understand the features of cloud simulator
- To apply different cloud programming model as per need.
- To learn to design the trusted cloud Computing system

UNIT - I: INTRODUCTION TO CLOUD COMPUTING

Introduction - Characteristics - Cloud Models - Cloud Services Examples-Cloud Based Services & Applications - Cloud concepts and Technologies – Virtualization – types - Pros and Cons.

UNIT - II: CLOUD SERVICES AND PLATFORMS

Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software-Virtualization- Characteristics-taxonomy-types- Pros and Cons.

UNIT – III: CLOUD APPLICATION DESIGN AND DEVELOPMENT

Design considerations for cloud applications- Reference Architecture for Cloud Applications- Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches.

UNIT – IV: MULTIMEDIA CLOUD, APPLICATION BENCHMARKING & TUNING

Introduction- streaming protocols- Cloud Application Benchmarking and Tuning: Introduction-workload characteristics- application performance metrics- Benchmarking methodology and tools-deployment prototyping.

UNIT – V: CLOUD SECURITY AND APPLICATIONS

Cloud Security: CSA Cloud Security Architecture - Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Healthcare- Energy Systems- Transportation Systems- Manufacturing Industry- Education.

TEXT BOOKS

1. ArshdeepBahga, Vijay Madiseti, “Cloud Computing: A Hands – On Approach” Universities press (India) Pvt. limited 2016.
2. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.

REFERENCES

1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
2. Michael Miller “Cloud Computing Web based application that change the way you work and collaborate online”. Pearson edition, 2008.
3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More, Jones & Bartlett Learning, 2012.

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www.thecloudtutorial.com/
https://www.tutorialspoint.com/cloud_computing/
www.javatpoint.com/cloud-computing-tutorial
<https://www.lynda.com/Cloud-Computing-training-tutorials/1385-0.html>
https://www.siteground.com/tutorials/cloud/cloud_computing.htm

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- To know the broad perceptive of cloud architecture and model.
- Familiar with Virtualization and design of cloud Services
- understand the features of cloud services
- To apply different cloud programming model as per need.
- To design the trusted cloud Computing system

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

PRACTICAL - VII: DESIGN AND ANALYSIS OF ALGORITHMS

1. Divide and Conquer with Recursive Function
2. Divide and Conquer with Non-Recursive Function
3. Strassen's Matrix Multiplication
4. Greedy Method
5. Dynamic programming
6. Shortest path problems
7. Travelling sales person problem
8. Back tracking- N-Queen problem, Graph Coloring
9. Sum of subsets, Hamiltonian problem
10. Modular Arithmetic & Bin Packing

1. Simple Android Application.
2. Working with Activity, Working with Fragments
3. UI Controls (Text, Edit Text, Button, Radio Button, Check Box, and Layout)
4. UI Controls (Image Button, Toggle Button, Rating Bar, List View, Gallery)
5. Working with Image Views (Gallery View, Grid View)
6. Working with Image Views (Image Switcher View, Context Menu for Image View)
7. CRUD Operations Using SQLite DB
8. Emailing
9. Telephony
10. SMS

CAREER BUILDING SKILLS

LEARNING OBJECTIVES

- Today's world is all about relationship, communication and presenting oneself, one's ideas and the company in the most positive and impactful way.
- This course intends to enable students to achieve excellence in both personal and professional life.

Unit - I: Attitude and Altitude, Lateral Thinking, Time is Money

Unit - II: Leaders are Born or Made - Team Building.

Unit - III: Inter-Personal Skills, Business Communication in English

Unit - IV: Presentation Skills, Business Correspondence, Self yourself

Unit - V: Interviews, Group Dynamics, Internet for Job Seekers

TEXT BOOK

1. Prof.G.Ravindran, Prof.S.Papu Benjamin Elango, Dr.L.Arockiam "SUCCESS THROUGH SOFT SKILLS", Institute For Communication and Technology, Tiruchirappalli-620 003.

REFERENCES

1. Shiv Khera, "You Can Win" – Macmillan Books – 2003 Revised Edition,
2. Stephen Covey, "7 Habits of highly effective people "
3. Dr R L Bhatia, "Managing Time for a competitive edge".
4. Robert Heller, "Effective leadership", Essential Managers DK publishers.
5. Newstrom, Keith Davis, "Organizational Behavior", Tata McGraw Hill.

WEB REFERENCES

<http://jobsearch.about.com/b/2014/01/27/top-7-most-important-soft-skills.htm>
<http://www.slideshare.net/RahulKunwar/soft-skill-training>
<http://www.wikihow.com/Develop-Interpersonal-Skills>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Develop effective communication skills (spoken and written).

- Develop effective presentation skills.
- Become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills.
- Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.
- Take part effectively in various selection procedures adopted by the recruiters

BIG DATA ANALYTICS**LEARNING OBJECTIVES**

- To understand the needs for Big Data and its environments.
- To learn the basic requirements of Big Data Technologies.
- To expose the knowledge of MapReduce programming framework (Hadoop).
- To be familiar with withNoSQL DB's Cassandra and MongoDB
- To understand Hive and Pig technologies for analyzing the Big Data.

UNIT - I: TYPES OF DIGITAL DATA AND BIG DATA

Classification of Digital Data - Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - Big Data Definition - Other Characteristics of Data Definitional Traits of Big Data – Need of Big Data - Information Consumer vs Produce Information -Traditional Business Intelligence (BI) versus Big Data - A Typical Data Warehouse Environment - A Typical Hadoop Environment.

UNIT - II: BIG DATA ANALYTICS AND TECHNOLOGY LANDSCAPE

Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Data Science - Data Scientist - Terminologies Used in Big Data Environments- Basically Available Soft State Eventual Consistency (BASE) - Few Top Analytics Tools; NoSQL (Not OnlySQL).

UNIT - III: HADOOP AND MAPREDUCE PROGRAMMING

Introducing Hadoop - RDBMS versus Hadoop - Distributed Computing Challenges - History of Hadoop - Hadoop Overview - Use Case of Hadoop - Hadoop Distributors - HDFS (Hadoop Distributed File System) - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator) - Interacting with Hadoop Ecosystem - Mapper - Reducer - Combiner - Partitioner.

UNIT - IV: MONGODB AND CASSANDRA

Terms Used in RDBMS and MongoDB - Data Types in MongoDB - MongoDB Query Language; Introduction to Cassandra - Apache Cassandra - An Introduction - Features of Cassandra - CQL Data Types - CQLSH - Keyspaces - CRUD (Create, Read, Update and Delete) Operations - Collections - Using a Counter - Time to Live (TTL) - Alter Commands Import and Export – Querying System Tables.

UNIT - V: HIVE AND PIG

Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language (HQL) - RCFile Implementation - SerDe - User-Defined Function (UDF) ; The Anatomy of Pig - Pig on Hadoop - Data Types in Pig - Running Pig - Execution Modes of Pig - Relational Operators - Pig versus Hive.

TEXT BOOK

1. Seema Acharya and SubhashiniChellappan, “Big Data and Analytics”, Wiley Publication.

REFERENCES

1. SoumendraMohanty, MadhuJagadeesh, and HarshaSrivatsa, “Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics”, Apress Publication. ‘Bid Data Now 2012 Edition”, O’Reilly, First Edition, 2012
2. Paul Zikopoulos, Thomas Deutsch, Dirk Deroos, David Corrigan, Krishnan Parasuraman and James Giles, “Harness the power of Big Data”, McGrawHill, 2013

WEB REFERENCES

Online Tutorial

<http://strata.oreilly.com/2010/09/the-smaq-stack-for-big-data.html>

http://blogs.computerworld.com/18840/big_data_smaq_down_storage_mapreduce_and_query

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Learn about types of digital data and big data
- Gain knowledge of various Big data analytics and its Technologies
- Study about various NoSQL databases and management techniques
- Work with NoSQL databases such as MongoDB and Cassandra
- Design Big data queries using Hive and Pig.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
			Unit I	Unit II	Unit III	Unit IV	Unit V	
A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

DATA SCIENCE WITH PYTHON

LEARNING OBJECTIVES

- To know the fundamental algorithmic ideas to process data.
- To learn to apply hypotheses and data into actionable predictions.
- To document and transfer the results and effectively communicate the findings using visualization techniques.
- To employ the Map reduce technique

UNIT – I: INTRODUCTION TO DATA SCIENCE

Python for Data Analysis - Essential Python Libraries – Installation and setup python basics: The python Interpreter- Ipython Basics- Data Structure and Sequences: Tuple – list.

UNIT - II: NUMPY AND UNIVERSAL FUNCTIONS

NumPy Basics: Arrays and Vectorized Computation -The NumPyndarray: A Multidimensional Array Object - Universal Functions: Fast Element-wise Array Functions - File Input and Output with Arrays - Linear Algebra - Random Number Generation.

UNIT - III: PANDAS

Getting started with pandas: Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics - Handling Missing Data -Hierarchical Indexing - Other pandas Topics.

UNIT - IV: DATA LOADING, STORAGE, AND FILE FORMATS

Reading and Writing Data in Text Format - Binary Data Formats - Interacting with HTML and Web APIs - Interacting with Databases - Data Wrangling: Clean, Transform, Merge, Reshape.

UNIT - V: PLOTTING AND VISUALIZATION

Plotting and Visualization: A Brief matplotlib API Primer - Plotting Functions in pandas -Python Visualization Tool Ecosystem - Time Series.

TEXT BOOKS

1. Wes McKinney, “Python for Data Analysis”, Published by O’Reilly Media, 2012.
2. Jake Vander Plas, “Python Data Science Handbook”, O’Reilly Media Publishers, 2016.
3. Curtis Miller, “Hands-On Data Analysis with NumPy and Pandas”, Packt Publications, June 2018.

REFERENCES

1. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
3. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”, Wiley, 2011.
5. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
6. 1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.com/wp/thinkpython/>) 2. Guido van Rossum and Fred L. Drake Jr, “An

Introduction to Python - Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.<http://www.network-theory.co.uk/docs/pytut/>)

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http://www.johndcook.com/R_language_for_programmers.html
<http://bigdatauniversity.com/>
<http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>
<https://www.datacamp.com/>
<https://www.dataquest.io/>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Preparing and pre-processing data
- Visualizing the results of analytics effectively
- Basic understanding of NumPy and Pandas
- Ability to use conditional loops and list by python
- Learn the Visualization through Matplotlib

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions
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A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	ANY THREE	15	Theory	Theory or Program	Program	Program	Theory or Program	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

MACHINE LEARNING

LEARNING OBJECTIVES

To introduce the concepts like

- conceptualization and summarization of big data and machine learning
- Introduction to the course, recap of linear algebra and probability theory basics.
- Bayesian Classification: Naive Bayes, Parameter Estimation (ML, MAP), Sequential Pattern Classification.
- Non-parametric Methods: k-Nearest Neighbours
- Discriminative Learning models: Logistic Regression, Perceptrons, Artificial Neural Networks, Support Vector Machines.

UNIT – I: INTRODUCTION TO MACHINE LEARNING

Learning Systems- Goals and Applications- Aspects of developing a learning system- Training data- Linear Perceptrons as Neurons- Neural Nets- Working- Layers- Activation Functions- Feed Forward Neural Networks- Limitations- DBNs- Deep learning for Bigdata- Local minima- rearranging neurons- Spurious local minima- Comparison of AI- Machine learning & Deep learning.

UNIT – II: TYPES OF LEARNING

Supervised Learning- Unsupervised Learning- Case Study- Classification- MLP in Practice- Overfitting-Linear and non-linear discriminative- decision trees- Probabilistic- K-nearest neighbor learning algorithm- curse of dimensionality.

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UNIT – III: LEARNING ALGORITHMS

Logistic Regression- Perceptron- Exponential Family- Generative Learning algorithms- Gaussian Discriminant Analysis- Naïve Bayes- SVM-Kernels- Model Selection- Bagging- Boosting- Evaluating and debugging- Classification errors.

UNIT – IV: UNSUPERVISED AND LEARNING ALGORITHMS

Clustering- K-means Clustering- EM algorithm- Mixture of Gaussians- Factor Analysis- Principal and Independent Component Analysis- latent Semantic Indexing- Spectral or sub-space clustering.

UNIT – V: REINFORCEMENT LEARNING, IOT AND MACHINE LEARNING

Markov Decision Processes- Bellman Equations- Value Iteration and Policy Iteration- Linear quadratic regulation- LQG Q-Learning- Policy versus value learning- POMDPs- IoT- Recent trends- various models. Case Study: Object Detection and smudging using gradient Descent, Spam Filtering based on Text Classification.

TEXT BOOKS

1. Rajiv Chopra, "Machine Learning", Khanna Publications, New Delhi, 2018.
2. V.K. Jain, "Machine Learning", Khanna Publications, New Delhi, 2018.

REFERENCES

1. Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 2013.
2. Pattern Classification, 2nd Ed., Richard Duda, Peter Hart, David Stork, John Wiley & Sons, 2001.
3. Pattern Recognition and Machine Learning, Christopher Bishop, Springer 2006.

WEB REFERENCES

<https://www.datacamp.com/courses/introduction-to-machine-learning-with-r>

<https://elitedatascience.com/learn-machine-learning>

<https://www.analyticsvidhya.com/learning-path-learn-machine-learning/>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- design and implement machine learning solutions to classification, regression, and clustering problems;
- evaluate and interpret the results of the algorithms.
- Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
- Ability to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
- Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
- Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

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A	ANSWER ALL	2	2	2	2	2	2	10
B	EITHER OR TYPE	7	Theory or Theory	Theory or Program	Theory or Program	Program or Program	Program or Program	5 Pairs
C	ANY THREE	15	Theory	Theory or Program	Program	Program	Theory or Program	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

ELECTIVE – IV: A. CRYPTOGRAPHY AND NETWORK SECURITY**LEARNING OBJECTIVES**

- To introduce Classical Encryption techniques
- To understand the principles of encryption algorithms
- To have a detailed knowledge about authentication, hash functions and application level security mechanisms.
- To introduce Network Security Concepts
- To understand the System level Security

UNIT – I: INTRODUCTION

Need for Security – Approaches- Principles- Types of Attacks- Cryptography Techniques: Plain text and Cipher Text – Substitution- Transposition- Encryption and Decryption- Symmetric and Asymmetric Key Cryptography- Steganography- possible attacks.

UNIT - II: SYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS

Algorithm Types and Modes - Overview of Symmetric – Key Cryptography – Data Encryption Standard – International Data Encryption Algorithm (IDEA) – RC4 –RC5- Blowfish – Advanced Encryption Standard (AES). Case Study: Diffie Hellman Key Exchange

UNIT - III: ASYMMETRIC KEY CRYPTOGRAPHIC ALGORITHMS

Introduction and Overview of Asymmetric-KeyCryptography – RSA Algorithm – ElGamal Cryptography – Symmetric – and Asymmetric- Key Cryptography – Digital Signatures – Knapsack Algorithm – Attack on Digital Signatures – Problems with the Public-Key Exchange.

UNIT - IV: INTERNET-SECURITY PROTOCOLS

Basic concepts of IS Protocols – Secure Socket Layer – Transport Layer Security – Secure Hyper Text Transfer Protocol – Secure Electronic Transaction -Email Security – Wireless Application Protocol Security.

UNIT – V: NETWORK SECURITY, FIREWALLS AND VPN

Introduction – Brief introduction to TCP/IP- Firewalls- types of firewalls- Firewall Configurations- Limitations of Firewall- IP Security- Virtual Private Networks- Intrusion: Intruders- Audit Records- Intrusion Detection- Distributed Intrusion Detection- Honeypots.

TEXT BOOKS

1. AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, Third Edition 2017.
2. William Stallings, "Cryptography and Network Security - Principles and Practices", Prentice Hall of India, Sixth Edition, 2014.
3. Behrouz A Forouzan, "Cryptography and Network Security", Tata McGraw-Hill, Third Edition 2018.

REFERENCES

1. AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.

WEB REFERENCES

www.tutorialspoint.com/cryptography/
www.iitg.ac.in/icdcn2006/isg.pdf
williamstallings.com/Cryptography/

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Provide security of the data over the network.
- Do research in the emerging areas of cryptography and network security.
- Implement various networking protocols.
- Protect any network from the threats in the world.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

Section	Type and Choice	Marks	Number of Questions from					Total Questions in each Section
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B	EITHER OR TYPE	7	1 Pair	1 Pair	1 Pair	1 Pair	1 Pair	5 Pairs
C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

ELECTIVE – IV: B. SOCIAL NETWORK ANALYSIS**COURSE OBJECTIVES:**

- To gain knowledge about the current web development and emergence of social web.
- To study about the modeling, aggregating and knowledge representation of semantic web.
- To appreciate the use of machine learning approaches for web content mining.
- To learn about the extraction and mining tools for social networks.
- To gain knowledge on web personalization and web visualization of social networks.

UNIT I CLUSTERING AND CLASSIFICATION

Supervised Learning – Decision tree - Naïve Bayesian Text Classification - Support Vector Machines - Ensemble of Classifiers – Unsupervised Learning – K-means Clustering – Hierarchical Clustering – Partially Supervised Learning – Markov Models – Probability-Based Clustering – Vector Space Model

UNIT II SOCIAL MEDIA MINING

Data Mining Essentials – Data Mining Algorithms - Web Content Mining – Latent semantic Indexing – Automatic Topic Extraction – Opinion Mining and Sentiment Analysis – Document Sentiment Classification

UNIT III EXTRACTION & MINING COMMUNITIES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive – Detecting Communities in Social Networks – Definition of Community – Evaluating Communities – Methods for Community Detection & Mining – Applications of Community Mining Algorithms – Tools for Detecting Communities – Social Network Infrastructure and Communities – Decentralized Online Social Networks – Multi-Relational Characterization of Dynamic Social Network Communities

UNIT IV HUMAN BEHAVIOR ANALYSIS AND PRIVACY ISSUES 9+6

Understanding and Predicting Human Behavior for Social Communities – User Data Management, Inference and Distribution – Enabling New Human Experiences – Reality Mining – Context-Awareness – Privacy in Online Social Networks – Trust in Online Environment – Trust Models Based on Subjective Logic – Trust Network Analysis – Trust Transitivity Analysis – Combining Trust and Reputation – Trust Derivation Based on Trust Comparisons – Attack Spectrum and Countermeasures

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph Theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing Online Social Networks – Visualizing Social Networks with Matrix-Based Representations – Node-Link Diagrams – Hybrid Representations – Applications – Covert Networks – Community Welfare – Collaboration Networks – Co-Citation Networks – Recommendation in Social Media: Challenges – Classical Recommendation Algorithms – Recommendation Using Social Context – Evaluating Recommendations

REFERENCES:

1. Peter Mika, "Social networks and the Semantic Web", Springer, 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 2010.
3. Bing Liu, "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-Centric Systems and Applications)", Springer; Second Edition, 2011.
4. Reza Zafarani, Mohammad Ali Abbasi, Huan Liu, "Social Media Mining", Cambridge

University Press, 2014.

5. GuandongXu, Yanchun Zhang and Lin Li, “Web Mining and Social Networking Techniques and applications”, Springer, 2011.
6. Dion Goh and Schubert Foo, “Social information retrieval systems: emerging technologies and Applications for searching the Web effectively”, Idea Group, 2007.

WEB REFERENCES

https://en.wikipedia.org/wiki/Social_network_analysis

http://mjdenny.com/workshops/SN_Theory_I.pdf

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Apply knowledge of current web development in the era of social web.
- Model, aggregate and represent knowledge for semantic web.
- Use machine learning approaches for web content mining.
- Design extraction and mining tools for social networks.
- Develop personalized web sites and visualization for social networks.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

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C	ANY THREE	15	1	1	1	1	1	5
TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

ELECTIVE – IV: C.SOFT COMPUTING**LEARNING OBJECTIVES**

- To learn the basic concepts of Soft Computing
- To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.
- To apply soft computing techniques to solve problems.
- To introduce fuzzy systems and its applications
- To impart knowledge on developing hybrid systems

UNIT- I: INTRODUCTION TO SOFT COMPUTING

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT – II: ARTIFICIAL NEURAL NETWORKS

Back propagation Neural Networks – Kohonen Neural Network -Learning Vector Quantization - Hamming Neural Network – Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines – Spike Neuron Models.

UNIT- III: FUZZY SYSTEMS

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets – Classical Relations and Fuzzy Relations - Membership Functions -Defuzzification – Fuzzy Arithmetic and Fuzzy Measures -Fuzzy Rule Base and Approximate Reasoning – Introduction to Fuzzy Decision Making.

UNIT – IV: GENETIC ALGORITHMS

Basic Concepts- Working Principles -Encoding- Fitness Function – Reproduction -Inheritance Operators – Cross Over – Inversion and Deletion -Mutation Operator – Bit-wise Operators - Convergence of Genetic Algorithm.

UNIT – V: HYBRID SYSTEMS

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination – LR-Type Fuzzy Numbers – Fuzzy Neuron – Fuzzy BP Architecture – Learning in Fuzzy BP- Inference by Fuzzy BP – Fuzzy ArtMap: A Brief Introduction – Soft Computing Tools – GA in Fuzzy Logic Controller Design – Fuzzy Logic Controller

TEXT BOOKS:

1. N.P.Padhy, S.P.Simon, “Soft Computing with MATLAB Programming”, Oxford University Press, 2015.
2. S.N.Sivanandam ,S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt. Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.VijayalakshmiPai, “Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications “, PHI Learning Pvt. Ltd., 2017.

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fuzzy and Soft Computing, Prentice-Hall of India, 2002.
2. KwangH.Lee, —First course on Fuzzy Theory and Applications, Springer, 2005.
3. George J. Klir and Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications, Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, —Neural Networks Algorithms, Applications, and Programming Techniques, Addison Wesley, 2003.

WEB REFERENCES

http://www.myreaders.info/html/soft_computing.html

<https://www.javatpoint.com/what-is-soft-computing>

<https://www.tutorialspoint.com/difference-between-ai-and-soft-computing>

LEARNING OUTCOMES

On successful completion of the course students will be able to:

- Apply suitable soft computing techniques for various applications.
- Integrate various soft computing techniques for complex problems.
- To analyze and visualize from fuzzy data
- To build a personalized recommender system.

BLUE PRINT OF THE SEMESTER QUESTION PAPER

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TOTAL NUMBER OF QUESTIONS			4	4	4	4	4	20

PRACTICAL – IX: DATASCIENCE WITH PYTHON

1. NumPy

- i. Computation on NumPy Arrays: Universal Functions
- ii. Aggregations: Min, Max, and Everything in Between
- iii. Computation on Arrays: Broadcasting
- iv. Comparisons, Masks, and Boolean Logic
- v. Fancy Indexing
- vi. Sorting Arrays
- vii. Structured Data: NumPy's Structured Arrays

2. Data Manipulation with Pandas

- i. Data Indexing and Selection
- ii. Operating on Data in Pandas
- iii. Handling Missing Data
- iv. Hierarchical Indexing
- v. Combining Datasets: Concat and Append
- vi. Combining Datasets: Merge and Join
- vii. Aggregation and Grouping
- viii. Pivot Tables
- ix. Vectorized String Operations
- x. Working with Time Series
- xi. High-Performance Pandas: eval() and query()

3. Visualization with Matplotlib

- i. Simple Line Plots
- ii. Simple Scatter Plots
- iii. Visualizing Errors
- iv. Density and Contour Plots
- v. Histograms, Binnings, and Density
- vi. Customizing Plot Legends
- vii. Customizing Colorbars
- viii. Multiple Subplots
- ix. Text and Annotation
- x. Customizing Ticks
- xi. Customizing Matplotlib: Configurations and Stylesheets
- xii. Three-Dimensional Plotting in Matplotlib
- xiii. Geographic Data with Basemap
- xiv. Visualization with Seaborn

4. Data Analysis using Numpy, pandas, matplotlib and seaborn(.csv, .txt etc.)

1. Decision Tree Algorithm
2. K-nearest neighbor learning algorithm
3. K-means clustering
4. Expectation Maximization algorithm
5. Principal Component Analysis
6. Independent Component Analysis
7. Latent Semantic Indexing
8. Spectral or Sub Space Clustering

RESEARCH INVESTIGATION

LEARNING OBJECTIVES

- To enable the students to choose an area of specialization.
- To help the students to focus on current research in computer science.
- To understand the research areas by collecting and reading research papers, analyzing Qualitative and quantitative aspects by a survey or implementation.

REGULATIONS

1. The department offers different research domains such as Big Data, Web Services, and Cloud Computing, e-Learning, Open Source Software Technology, Data Mining, Semantic Web, Ontology and Language Technology.
2. Students have to join these research groups during their fourth semester.
3. Students have to search for the topic in reputed Journals to find problem and asked to develop a solution or survey from the collected papers.
4. Students are expected to present the outcome of their experiments and analysis.
5. Students are expected to prepare an individual technical report on the field of their study.
6. Topics for study are given below. The students can choose any one of these topics or suggest a relevant topic in consultation with the Research Supervisor. The research areas are not limited to the below:
 - a. eLearning
 - b. Web Services
 - c. Data Mining
 - d. Big Data Analytics
 - e. Software Metrics
 - f. Cloud Computing
 - g. Ontology and Semantics
 - h. Internet of Things
7. The student has to present the research paper as a report and that will be evaluated by a committee of two internal faculty members.
8. The student has to make an oral presentation for about 15 minutes including question and answer sessions before this committee.
9. There is no external Examination.

Evaluation

Report	- 80 Marks
i. First Phase – Report	- 15 Marks
ii. Presentation - I	- 15 Marks
iii. Second Phase – Report	- 15 Marks
iv. Presentation - II	- 15 Marks
v. Documentation	- 20 Marks
Viva-Voce	- 20 Marks
Total	- 100 Marks

15. SOFTWARE PROJECT

15.1 Regulations for third semester

- The Project work is carried out in a team; each team consists of maximum two members.
- Each team has to select an exclusive problem and the team has to develop an application to provide the solution to the problem.
- Each student in a team has to deal with a specific area in the problem and submit the report separately.
- Faculty members assigned to each group shall supervise the progress of the software project.
- After finalizing software project title with the guide, change of title is not allowed.
- The phases of the software project are project management, requirement analysis, design, implementation and testing.
- The report shall be in A4- size paper and in original. However, photocopies are accepted for reports and forms only.
- Plagiarism, when detected will result in zero marks, without the possibility for submission.
- In the course of the project development, each student must have regular consultations with the Guide. The consultation is meant to review the candidate's progress, besides advising on any project issues. A minimum of five consultations throughout the whole software project is essential to accept a software project for evaluation.
- During each consultation, the candidate must submit the intermediate deliverables to the guide for review. The deliverables will be assessed and marks will be allocated during the software project presentation. Each Consultation Report must reflect the detailed tasks completed for the week, problems encountered in the course of the software project and how he/she resolved them and the plan for the next phase.
- A copy of the software project report is to be submitted by the prescribed time announced by the department.
- A student shall be declared to be successful in the project if he/she secures 50% or above in the semester examinations and 50% or above in the aggregate of CIA & Semester examinations. If a candidate fails, he/she has to improve his/her software project and re-submit in the following year.
- Viva Voce is compulsory for all the candidates who have submitted the software project. If a candidate is absent for viva-voce then his/her absence is treated as absent for the semester examination.

Evaluation

The software project will be evaluated on the following components.

CA

- 50 Marks

1.	First Review	25 Marks
	First Review should cover the following artifacts 1. Requirement analysis 2. Design	
2.	Second Review	25 Marks
	Second Review should cover the following artifacts 1. Implementation 2. Testing	

Semester Examination

- 50 Marks

1. Evaluation of Project Work

40 Marks

- a. Software - 20 Marks
- b. Testing - 10 Marks
- c. Documentation - 10 Marks

2. Viva – Voce

10 Marks.

- The semester evaluation is carried out by the external and internal examiner individually. The average of both evaluations is awarded as the final mark for software project.

15.2 Regulations for the Final Semester

- A Coordinator will be appointed by the Head of the Department to coordinate the software project.
- Internal guides from the department will be assigned to the students.
- The software project shall be an independent one. Combined projects are not allowed.
- After finalizing software project title with the guide, change of title is not allowed.
- The phases of the software project are project management, requirement analysis, design, implementation and testing.
- Plagiarism, when detected will result in zero marks, without the possibility for submission.
- In the course of the project development, each student must have regular consultations with the Guide. The consultation is meant to review the candidate's progress, besides advising on any project issues. A minimum of five consultations throughout the whole software project is essential to accept a software project for evaluation.
- During each consultation, the candidate must submit the intermediate deliverables to the guide for review. The deliverables will be assessed and marks will be allocated during the software project presentation. Each Consultation Report must reflect the detailed tasks completed for the week, problems encountered in the course of the software project and how he/she resolved them and the plan for the next phase.
- A copy of the software project report is to be submitted by the prescribed time announced by the department.
- Two Reviews will be conducted before the Final Viva-Voce.
- The report shall be in A4- size paper and in original. However, photocopies are accepted for reports and forms only.
- Two copies of the project report to be submitted at prescribed time announced by the department.
- A student shall be declared to be successful in the project if the candidate secures 50% or above in the Examination and 50% or above in the aggregate of CA and Semester Examination. If a candidate fails he/she has to improve their project work and re-submit in the following even semester.
- Viva-Voce is compulsory for all the candidates who have submitted the project work. If a candidate is absent for viva voce, and then his absence will be treated as absence for the semester examinations.

Evaluation

The Software Project work will be evaluated on the following components.

CA		- 50 Marks
1.	First Review	25 Marks
	First Review should cover the following artifacts 1. Requirement analysis 2. Design	
2.	Second Review	25 Marks
	Second Review should cover the following artifacts 1. Implementation 2. Testing	

Semester Examination - 50 Marks

1. Evaluation of Project Work**40 Marks.**

- a. Software - 20 Marks
- b. Testing - 10 Marks
- c. Documentation - 10 Marks

2. Viva – Voce**10 Marks**

- Two examiners will evaluate the project work report separately and the average is calculated as a final mark for the Semester examination

15.3 Template for Software Project

Project Area	Work products
Project Management	• Project Proposal
	• Project Plan
	Project Review Record-1
Requirements	• System Study (SSD)
	• Vision Document (VSD)
	• Use-Case Diagram
	• Use-Case Specification (UCS)
	Project Review Record-2
First Review	Draft Report (Combination of all work products)
Analysis and Design	• Sequence Diagram
	• Architecture Diagram
	• Database Design (Table Design, Data integrity & Constraints)
	• Class Diagram
	• Component Diagram
	• Test Case Design
	• User Interface Design
	Project Review Record-3
Mid -Term evaluation (second review)	• Draft Report (Combination of all work products)
	Project Evaluation Report-1
	• Program code
	Project Review Record-4
Test	• Unit, Integration, System test plan
	• Test Case Results
	Project Review Record-5
Evaluation (Third Review)	Project Report
	• Project Presentation
	• Application Demo