E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

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Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF COMPUTER APPLICATIONS

CBCS SYLLABUS

MASTER OF COMPUTER APPLICATIONS

PROGRAMME CODE - MC

COURSE STRUCTURE

(w.e.f. 2018 – 2019 onwards)

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CRITERION - I

1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System

Syllabus copies with highlights of contents focusing on Elective Course System

To be Noted:

HIGHLIGHTED	COURSE
	Elective

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
COURSE STRUCTURE - SEMESTER WISE
(w.e.f. 2018-2019 Batch onwards)

Sem	Sub. Code	Title of the Paper	Teaching Hours/ Week	Duration of exam (hrs)	Marks Allotted			Credits
					C.A	S.E	Total	
1	18MC11	Mathematical Foundation of Computer Application	5	3	25	75	100	4
	18MC12	Digital Principles & Computer Organization	5	3	25	75	100	5
	18MC13	Programming in C	5	3	25	75	100	5
	18MC14	Relational Database Management Systems	5	3	25	75	100	5
	18MC11P	Programming in C Lab	5	3	40	60	100	3
	18MC12P	RDBMS Lab	5	3	40	60	100	3
2	18MC21	Object Oriented Programming using C++	5	3	25	75	100	4
	18MC22	Data Structures and Algorithms	5	3	25	75	100	5
	18MC23	Operating Systems	5	3	25	75	100	5
	18MC24	Computer Graphics & Multimedia	5	3	25	75	100	5
	18MC21P	Data Structures & Algorithms using C++ Lab	5	3	40	60	100	3
	18MC22P	Computer Graphics & Multimedia Lab	5	3	40	60	100	3
3	18MC31	Optimization Techniques	5	3	25	75	100	5
	18MC32	Programming in Java	5	3	25	75	100	5
	18MC33	Data Communications and Networking	5	3	25	75	100	5

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3	18MC34	Software Engineering	5	3	25	75	100	5
	18MC31P	Programming in Java Lab	5	3	40	60	100	3
	18MC32P	Linux Programming Lab	5	3	40	60	100	3
4	18MC41	Open Source Technology	5	3	25	75	100	5
	18MC42	Mobile Computing	5	3	25	75	100	5
	18MC43	Principles of Compiler Design	5	3	25	75	100	5
		Elective – I	5	3	25	75	100	5
	18MC41P	Open Source Technology Lab	5	3	40	60	100	3
	18MC42P	Mobile Computing Lab	5	3	40	60	100	3
5	18MC51	Web Technologies	5	3	25	75	100	5
	18MC52	Cryptography & Network Security	5	3	25	75	100	5
	18MC53	Data Mining & Data Warehousing	5	3	25	75	100	5
		Elective –II	5	3	25	75	100	5
	18MC51P	Web Technology Lab	5	3	40	60	100	3
	18MC52P	Data Mining & Data Warehousing Lab using Open Source Tools	5	3	40	60	100	3
6	18MCPR6	Project – Viva Voce	-	Viva	100	100	200	12
Total			150					140

Electives:

Semester IV

Elective – I (Choose any One)

1. Cloud Computing	-	18MCE4A
2. Soft Computing	-	18MCE4B
3. Enterprise Resource Planning	-	18MCE4C

Semester V

Elective – II (Choose any One)

1. Big Data Analytics	-	18MCE5A
2. Digital Image Processing	-	18MCE5B
3. Internet Of Things	-	18MCE5C

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)
ELECTIVE - I

Title of the Paper : Cloud Computing
Semester : IV **Contact Hours : 5**
Sub Code : 18MCE4A **Credits : 5**

Objective:

The benefits of cloud computing are being recognized in businesses and institutions. The immediate benefits of cloud computing are obvious: cloud-based applications reduce infrastructure and IT costs, increase accessibility, enable collaboration, and allow organizations more flexibility in customizing their products both for their brand and for their audience.

Unit – I

Era of Cloud Computing : Getting to know the Cloud – Components of Cloud Computing – Cloud Types –Private , Public and Hybrid , Cloud Computing Service Delivery Models .**Cloud Computing Services –** Infrastructure as a Service(IaaS) – Platform as a Service(PaaS) – Leveraging PaaS for Productivity – Software as a Service(SaaS) – Database as a Service(DBaaS) – Specialized Cloud Services. **Cloud Types and Models** – Private Cloud –Components of a Private Cloud – Community Cloud – Public Cloud – Public Cloud – Hybrid Clouds. Cloud Deployment Techniques – Cloud Network Topologies – Automation for Cloud Deployments – Self-Service Features in a Cloud Deployment – Federated Cloud Deployments – Cloud Performance – Impact of Memory on Cloud Performance – Improving Cloud Database Performance .

Unit – II

Cloud Computing and Business Value : Key Drivers for Cloud Computing – Cloud Computing and Outsourcing – Types of Scalability – Distribution over the

Internet. **Demsystifying Cloud Computing :** Myths and Truths . **Recent Trends in Cloud Computing and Standards :** Recent Trends in – Conflict of Interest for Public Cloud and IT Product Providers – Cloud Compliance – BYOD and Encryption Exposures – Cloud Standards – Cloud Ratings – Cloud Computing Trends that are Accelerating Adoption . **Data Security in the Cloud :** Challenges with Cloud Data - Challenges with Data Security – Data Confidentiality and Encryption – Data Availability – Data Integrity – Cloud Data Management Interface – Cloud Storage Gateways(CSGs) – Cloud Firewall – Virtual Firewall.

Unit – III

Application Architecture for Cloud : Cloud Application Requirements – Architecture for Traditional Versus Cloud Applications – Fundamental Requirements for Cloud Application Architecture – Use of Client-Server Architecture for Cloud Applications – Addressing Cloud Application Performance and Scalability –Service Oriented Architecture (SOA) for Cloud Applications – Parallelization within Cloud Applications. **Cloud Programming :** Programming Support for Google Apps Engine – Programming Support for Amazon EC2. **Migrating Applications to the Cloud :** Cloud Migration Techniques – Phase during Migration of an Application to the cloud – Cloud emulators and its use for Application Testing and Migration.

Unit – IV

SLA with Cloud Service Providers : The Concept of an SLA , SLA aspects and requirements – Service Availability – Cloud Outages – Credit Calculation for SLA Breaches – Sample SLA . **Introducing Virtualization :** Introducing Virtualization and its benefits – Implementation Levels of Virtualization – Virtualization at the OS Level – Virtualization Structure – Virtualization Mechanisms – Open Source Virtualization Technology – Xen Virtualization Architecture - Binary Translation with full Virtualization – Paravirtualization with Compiler Support – Virtualization of CPU , Memory and I/O Devices , Hardware Support for Virtualization in Intex x86 Processor – Virtualization in Multicore Processors .

Unit – V

Application Development for Cloud : Developing On-Premise Versus Cloud Applications – Modifying Traditional Application for Deployment in the Cloud – Stages during the Development Process of Cloud Application – Managing a Cloud Application – Using Agile Software Development for Cloud Applications – Static Code Analysis for Cloud Applications – Developing Synchronous and Asynchronous Cloud Applications. **Application Security in the Cloud :** Cloud Application Software Development Lifecycle(SDLC) – Cloud Service Reports by Providers – Application Security in an IaaS Environment - Application Security in an PaaS Environment - Application Security in an SaaS Environment .**Mobile Cloud Computing :** Definition of Mobile Cloud Computing – Architecture of Mobile Cloud Computing – Benefits of Mobile Cloud Computing - Mobile Cloud Computing Challenges .

Text Book:

Kailash Jayawal , Jagannath Kallakurchi , Donald J.Houde , Dr. Deven Shah, *Cloud Computing Black Book* , Dreamtech Press , 2014 Edition .

Chapters:

Unit - I **:** 1, 3 , 6 , 8

Unit - II **:** 4 , 5 , 9 , 10

Unit - III **:** 12 , 13 , 16

Unit - IV **:** 18 , 2

Unit - V **:** 24 , 25 , 27

Reference Books:

1. Thomas Fri, Ricardo Puttini, Zaigham Mahmood, *Cloud Computing: Concepts, Technology & Architecture*, PHI ,2013
2. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter , *Cloud Computing "A Practical Approach" Cloud Computing "A Practical Approach",* McGraw-Hill Education Pvt Ltd, 2009.
3. Arshdeep Dahga , Vijay Madisetti , *Cloud Computing A Hands – on Approach,* Universities Press , Reprint 2016
4., Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, Elsevier, *Distributed and Cloud Computing From Parallel Processing to the Internet of Things* , 2012.
5. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, *Cloud Computing: Principles and Paradigms*, Wiley Publishing , 2011.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

ELECTIVE - I

Title of the Paper : Soft Computing
Semester : IV **Contact Hours : 5**
Sub Code : 18MCE4B **Credits : 5**

Objective:

To acquire knowledge in Neural Networks, Fuzzy Networks , feed forward network , associative memory, counter propagation and SOM.

Unit –I

Introduction : Hard Computing – Soft Computing – Hybrid Computing . **Optimization and Some Traditional Methods :** Introduction to Optimization – Traditional Methods of Optimization .

Unit – II

Introduction to Genetic Algorithms : Working Cycle of a Genetic Algorithm – Binary-Coded GA . GA – parameters Setting – Constraints Handling in GA – Advantages and Disadvantages of Genetic Algorithms – Combination of Local and Global Optimum Search Algorithms . **Some Specialized Genetic Algorithm :** Real-Coded GA – Micro-GA – Visualized Interactive GA – Scheduling GA .

Unit – III

Introduction to Fuzzy Sets : Crisp Sets – Fuzzy Sets – Measures of Fuzziness and Inaccuracy of Fuzzy Sets . **Fuzzy Reasoning and Clustering :** Fuzzy Logic Controller – Fuzzy Clustering.

Unit – IV

Fundamentals of Neural Networks : Introduction – Static vs. Dynamic Neural Networks - Training of Neural Networks .**Some Examples of Neural Networks :** Multi-Layer Feed-Forward Neural Network(MLFFNN) – Radial Basis Function Network(RBFN) – Self-Organization Map(SOM) – Counter-Propagation Neural Network(CPNN) – Recurrent Neural Networks (RNNs).

Unit – V

Combined Genetic Algorithms : Fuzzy Logic : Fuzzy-Genetic Algorithm – Genetic-Fuzzy System . **Combined Genetic Algorithms : Neural Networks :** Working Principle of a Genetic - Neural System . **Applications of Soft Computing :** Applications of soft computing in Design and Development of Intelligent Autonomous Robots – Applications of Soft Computing in Data Analysis .

Text Book:

Dilip K.Pratihar , *Soft Computing Fundamentals and Applications* , Narosa Publishing House , Revised Edition , 2015.

Chapters:

Unit I : 1 , 2

Unit II : 3 , 4

Unit III : 7 , 8

Unit IV : 9 , 10

Unit V : 11, 12 , 14

Reference Books:

1. Laurene Fausett , *Fundamentals of Neural Networks* , Pearson, 8th Edition , 2012.
2. Timothy J.Ross, *Fuzzy Logic with Engineering Applications* , Wiley Publisher, 3rd Edition , 2011.
3. Samir Roy , *Introduction to Soft Computing* , Pearson Education , 1st Edition , 2013.
4. Sushil Kumar Singh , *Soft Computing : Neural Networks , Fuzzy Logic and Genetic Algorithms* , Galgotia ,1st Edition , 2012.
5. S.N.Sivanandam and S.N.Deepa , *Principles of Soft Computing* , Wiley Publisher, 2nd Edition , 2011.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

ELECTIVE - I

Title of the Paper : Enterprise Resource Planning
Semester : IV **Contact Hours : 5**
Sub Code : 18MCE4C **Credits : 5**

Objective:

To obtain knowledge about Advanced Technology in ERP, ERP Security, Business Modeling and Architecture.

Unit - I

Introduction: Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP.

Unit - II

ERP and Related Technologies: ERP and Related Technologies - Advanced technology and ERP Security.

ERP Marketplace and Functional Modules: ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package.

Unit - III

ERP Implementation: ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies .

Unit - IV

ERP Implementation: ERP Implementation Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation

Unit - V

ERP – Present and Future: ERP and E-Business – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP

Text Book:

Alexis Leon, ERP Demystified , Tata Mc-Graw Hill , 3nd Edition , 2014.

Chapters:

Unit - I	: 3, 4, 5, 7.
Unit - II	: 8, 9, 10, 11.
Unit - III	: 13, 14, 15
Unit - IV	: 17, 18, 19, 20.
Unit - V	: 23, 24, 25.

Reference Books:

1. Joseph Brady A., Ellen Monk F., Bret Wagner, *Concepts in Enterprise Resource Planning* , Thompson Course Technology , 1st Edition , 2001.
2. Vinod Kumar Garg and Venkitakrishnan N K, *Enterprise Resource Planning – Concepts and Practice* , PHI , 2nd Edition , 2003
3. Mary Sumner , *Enterprise Resource Planning* , Pearson Education , 9th Edition , 2012
4. Alexis Leon , *Enterprise Resource Planning* , Mc-Graw Hill Education ,2nd Edition , 2014.
5. Jaiswal , *Textbook of Enterprise Resource Planning* , Macmillan Publishers , 1st Edition , 2005.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Big Data Analytics
Semester : V **Contact Hours : 5**
Sub Code : 18MCE5A **Credits : 5**

Objectives:

A comprehensive end-to-end guide that gives hands-on practice in big data and Artificial Intelligence.

Unit – I

Types of Digital Data: Classification of Digital Data – Structured data – Semi-Structured Data – Unstructured Data **– Introduction of Big Data –** Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – What is Big Data? – **Big Data Analytics:** Where do we Begin? – What is Big Data Analytics? – What Big Data Analytics Isn't? – Why this sudden Hype around Big data Analytics? – Classification of Analytics - Top challenges facing Big Data – Why is Big Data Analytics Important? – Data Science - Terminologies Used in Big Data Environment.

Unit – II

The Big Data Technology Landscape - NoSQL – Hadoop - .**Introduction to Hadoop :** Introduction to Hadoop – Why Hadoop? -Why not RDBMS? – RDBMS versus Hadoop – Distributed Computing Challenges - History of Hadoop - Hadoop Overview - Use case of Hadoop - Hadoop Distributors – HDFS – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN – Interacting with Hadoop Ecosystem.

Unit – III

Introduction to MongoDB : What is MongoDB? - Why MongoDB? – Terms Used in RDBMS and MongoDB –Data Types in MongoDB – **Introduction to Cassandra:** Apache Cassanda – An Introduction – Features of Cassandra – Collections – Alter Commands – Import and Export – Querying System Tables.

Unit – IV

Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner - Searching – Sorting – Compressing – **Introduction to Hive:** What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language(HQL)

Unit – V

Introduction to Pig: What is Pig? - The Anatomy if Pig – Pig on Hadoop – Data Types in Pig – Running Pig – Execution Modes of Pig – HDFS Commands – Eval Functions – Complex Data Types **– Introduction to Machine Learning** – Introduction to Machine Learning - Machine Learning Algorithms.

Text Book:

Seema Acharya , Subhashini Chellappan, *Big Data and Analytics WILEY*, Reprint 2018.

Chapters:

Unit - I : 1.1 – 1.1.3, 2.1 - 2.5, 3.1 -3.5, 3.7, 3.10, 3.12

Unit - II : 4.1 – 4.2, 5.1, - 5.13.

Unit - III : 6.1 – 6.4, 7.1 – 7.2, 7.7, 7.10 - 7.12

Unit - IV : 8.1 – 8.8, 9.1 - 9.5

Unit - V : 10.1-10.3,10.7-10.10, 10.12 – 10.13, 12.1 – 12.2.

Reference Books:

1. Venkat Ankam, Big Data Analystics, Packt Publisher, 1st Edition, 2016.
2. David Loshin, Big Data Analytics, MK Publisher, 1st Edition,2013.
3. Jovan Pehcevski, Big Ata Anlytics- Methods and Applications, Arcler Education Incorporated, 1st Edition, 2018.
4. Mayank Bhushan ,Big Data and Hadoop: Learn by example 1st Edition, Kindle Edition.
5. Syed Muhammad Fahad Akhtar , Big Data Architect's Handbook: A guide to building proficiency in tools and systems used by leading big data experts Kindle Edition.

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M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Digital Image Processing
Semester : V **Contact Hours : 5**
Sub Code : 18MCE5B **Credits : 5**

Objectives:

To study two-dimensional Signals and Systems. To understand image fundamentals and transforms necessary for image processing.

Unit-I:

Introduction: What Is Digital Image Processing? - The Origins of Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image Processing System. **Digital Image Fundamentals**: Image Sampling and Quantization – Some Basic Relationships between Pixels.

Unit –II:

Intensity Transformations and Spatial Filtering: Background – Histogram Processing – Smoothing Spatial Filters. **Filtering in the Frequency Domain:** Image Smoothing Using Frequency Domain Filters – Selective Filtering.

Unit-III:

Image Restoration and Reconstruction: A Model of the Image Degration/Restoration Process – Noise Models. **Color Image Processing:** Color Fundamentals – Color Models – Pseudocolor Image Processing – Basics of Full-Color Image Processing.

Unit-IV:

Wavelets and Multiresolution Processing: Multiresolution Expansions – Wavelet Transforms in One Dimension. **Image Compression:** Some Basic Compression

Methods: Huffman Coding – Golomb Coding – Arithmetic Coding – LZW Coding. **Image Segmentation: Thresholding:** Foundation – Basic Global Thresholding.

Unit-V:

Morphological Image Processing: Erosion and Dilation – Some Basic Morphological Algorithms: Boundary Extraction – Hole Filling – Extraction of Connected Components – Convex Hull – Thinning – Thickening. **Representation and Description:** Representation: Boundary (Border) Following – Chain Codes. Boundary Descriptors. **Object Recognition:** Patterns and Patterns Classes – Recognition based on Decision-Theoretic Methods: Matching – Optimum Statistical Classifiers. Structural Methods.

Text Book:

Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "*Digital Image Processing*", 3rd Edition Tata Mc Graw Hill Pvt. Ltd., 2016.

Chapters:

Unit-I : 1.1-1.2, 1.4 -1.5, 2.4-2.5

Unit-II : 3.1, 3.3, 3.5, 4.8, 4.10

Unit-III : 5.1-5.2, 6.1- 6.4,

Unit-IV : 7.2-7.3, 8.2, 8.2.1-8.2.4, 10.3, 10.3.1-10.3.2

Unit-V : 9.2, 9.5, 9.5.1-9.5.6, 11, 11.1.1 – 11.1.2, 11.2, 12.1, 12.2.1-12.2.2, 1 2.3

Reference Books:

1. Willliam K Pratt, "*Digital Image Processing*", John Willey, 2002.
2. S. Jayaraman, S. Esakkirajan And T. Veerakumar *Companion for Digital Image Processing, ,* Scilab Textbook, 2016 ,
3. Anil Jain K. "*Fundamentals of Digital Image Processing*", PHI Learning Pvt. Ltd., 2015.
4. Malay K. Pakhira, "Digital *Image Processing and Pattern Recognition*", 1st Edition, PHI Learning Pvt. Ltd., 2013.
5. Sonka-Hlavac-Boyle,*Image Processing,* 3rd edition, Analysis and Machine Vision 2014.

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DEPARTMENT OF COMPUTER APPLICATIONS

M.C.A
(w.e.f. 2018-2019 Batch onwards)

Title of the Paper : Internet Of Things
Semester : V **Contact Hours : 5**
Sub Code : 18MCE5C **Credits : 5**

Objectives:

To acquire knowledge about Internet of things, Domain Specific IoTs, IoT and M2M, IoT System Management, Platform design methodology, IoT Systems, IoT physical devices, Data Analytics for IoT.

Unit – I

Introduction to Internet of Things: Introduction – Physical Design of IoT-Logical Design of IoT-IoT Enabling Technologies- IOT Levels & Deployment Templates .D**omain Specific IoTs:** Introduction – Home Automation- Cities-Environment-

Unit –II

D**omain Specific IoTs:** Energy-Retail- Logistics-Agriculture-Industry- Healthy & Lifestyle. **IoT and M2M:** Introduction- M2M-Diference between IoT and M2M-SDN and NFV for IoT. **IoT System Management with NETCONF-YANG:**Need for IoT Systems management - Simple Network Management Protocol(SNMP)-Network Operator Requirements- NETCONF- YANG- IoT Systems Management with NETCONF-YANG

Unit –III:

IoT Platforms Design Methodology: Introduction – IoT Design Methodology- **IoT Systems – Logical Design using Python**: Introduction- Installing Python – Python Data Types & Dta Structures – Control Flow- Functions- Modules- Packages- File Handling – Date/ Time Operations- Classes- Python Packages of Interest for IoT

Unit- IV:

IoT Physical Devices & Endpoints: What is an IoT Device-Exemplary Device:Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi wtth Python – Other IoT Devices. **IoT Physical Servers & Cloud Offerings**: Introduction to Cloud Storage Models & Communication APIs- WAMP- AutoBahn for Iot . Xively Cloud for IoT- Python Web Application Framework – Django- Designing a RESTful Web API.

Unit – V:

Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie- Apache Spark- Apache Storm.

Text Book:

Arshdeep Bahga, Vijay Madisetti., Internet of Things , Universites Press India Private Ltd 1st Edition , 2015.

Chapters:

Unit - I :1.1 to 1.5 , 3, 2.1 to 2.4
Unit - II : 2.5 to 2.10, 3.1 to 3.4, 4.1 to 4.6
Unit - III : 5.1, 5.2, 6.1 to 6.11
Unit - IV : 7.1 to 7.7 8.1 to 8.5
Unit - V : 10.1 to 10.6

Reference Books:

1. Jamil Y. Khan and Mehmet R. Yuce, The *Internet of Things, Systems and Applications,* Jenny Stanford Publishing , 1st edition ,2019.
2. Pethuraj and Anupama C. Raman, *The Internet of Things,* CRC Press, An Auerbach Book,2017.
3. AdrianMcEwen & HakimCassimally, Designing The Internet of Things, Willey Publication, 1st Edition, 2014.
4. Pradeeka seneviratne, Hands – on Internet of Things with Blnk, Packt Publishing, 2018.
5. Sean Smith, The Internet of Risky Things: Trusting the Devoices and Surround us, O'Reilly Media, 1st Edition 2017.