DEPARTMENT OF COMPUTER APPLICATIONS

PREAMBLE

UG **:** Programme profile and the syllabi of courses in the V & VI semesters along with evaluation components III & IV (with effect from 2018-2021 batch onwards)

PROGRAMME PROFILE: BCA

PROGRAMME SPECIFIC OUTCOMES (PSO)

Upon Completion of the Programme, the Students will able to
- Understanding of the key concepts and principles of programming languages.
- Capacity to analyze a problem, identify the computing requirements and using procedures find a solution.
- Development of practical skills to solve problems and provide solutions using current trends in the discipline of Computer Applications.
- Ability to apply the algorithmic principles, mathematical foundations and Computer science theory for designing Computer-based systems.

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hrs/ Week	Credit Min/Max
I	I	Language	UTAL105/ UTAL106/ UHIL101/ UFRL101	Basic Tamil-I/ Advanced Tamil-I/ Hindi-I/ French-I	-	4	2/3
	II	English	UENL107/ UENL108	General English-I/ Advanced English-I	-	5	3/4
	III	Core I	UCAM107/ UCSM106	Programming in C	UCAM105	6	5
	III	Core II	UCAM108/ UCSM108 UCAM109/ UCSM109	Fundamental of Computer Science/ Advanced Computer Science	UCAM106	5	4
	III	Core Practical I	UCAR105/ UCSR108	Programming in C- Practical	UCAR104	3	2
	III	Allied I	UMAA110	Mathematical Methods-I	-	5	4
	IV	Value Education				2	1
					Total	**30**	**21/23**
II	I	Language	UTAL205/ UTAL206/ UHIL201/ UFRL201	Basic Tamil-II/ Advanced Tamil-II/ Hindi-II/ French-II	-	4	2/3
	II	English	UENL207/ UENL208	General English-II/ Advanced English-II	-	5	3/4
	III	Core III	UCAM205/ UCSM206	Data Structures	UCAM204	6	6
	III	Core Practical II	UCAR204/ UCSR205	Data Structures - Practical	UCAR203	4	3
	III	Allied II	UMAA216	Mathematical Methods-II	-	5	4

	IV	Non - Major Elective				4	2
	IV	Soft Skill				2	1
	V	Extension Programme/ Physical Education/NCC				-	1
					Total	**30**	**22/25**
III	III	Core IV	UCAM310/ UCSM305	Java Programming	UCAM307	5	5
	III	Core V	UCAM308	MIS and ERP	-	5	4
	III	Core VI	UCAM311	Data Communication Networks	UCAM309/ UCAM405	6	5
	III	Core Practical III	UCAR304/ UCSR308	Java Programming - Practical	UCAR303	4	3
	III	Allied III	UCOA303	Financial Accounting	-	5	5
	IV	Online course		NPTEL/Spoken Tutorial/Swayam	-	3	1/2
	IV	Value Education				2	1
					Total	**30**	**24/25**
IV	III	Core VII	UCAM404	Database Management System	-	6	5
	III	Core VIII	UCAM403	Object Oriented Analysis and Design	-	5	4
	III	Core IX	UCAM407	Python Programming	UCAM406	6	5
	III	Core Practical IV	UCAR402	Database Management System - Practical	-	3	2
	III	Core Practical V	UCAR404	Python Programming- Practical	UCAR403	3	2
	III	Allied IV	UCOA403/ UCOR403	Accounting Package	-	5	5
	IV	Soft skill				2	1
	V	Extension Programme/ Physical Education				-	2
					Total	**30**	**24/26**
V	III	Core X	UCAM507	Operating System	UCAM506/ UCAM606	5	5
	III	Core XI	UCAM509	Software Engineering	UCAM504	5	4
	III	Core XII	UCAM505	Web Programming	-	6	5
	III	Core XIII	UCAM508	Open Source Technology	UCAM501	6	5
	III	Core Practical VI	UCAR506	Open Source Technology - Practical	UCAR504	3	2
	III	Core Practical VII	UCAR505	Web Programming - Practical	-	3	2
	IV	Value Education				2	1
					Total	**30**	**24**
VI	III	Core XIV	UCAM609	Data Mining	UCAM606	5	4
	III	Core XV	UCAM610	Computer Graphics	UCAM607	5	4
	III	Core XVI	UCAM611	Basics of IOT	UCAM608	4	3
	III	Core Practical VII	UCAR602	Data Mining - Practical	UCAR602	4	3

	III	Core Project	UCAP601	Project		5	5
	III	Major-Elective	UCAO606/ UCAO604	Fundamentals of Security/ Cloud Computing	UCAO605	5	4
	III	Viva-Voce	UCAM601	Comprehensive Viva Voce	-	-	1
	IV	Soft Skill				2	1
	V	Extension Programme/ Physical Education/NCC				-	2
					Total	**30**	**25/27**
					Grand Total	**180**	**140/150**

NON-MAJOR ELECTIVE

Semester	Part	Category	Course Code	Course Title	Previous Course Code	Contact Hrs/week	Credit
II	IV	Non Major Elective	UCAE207	Data Science Using R	-	4P	2
			UCAE208	Cyber Forensics	-	4T	2
			UCAE209	PyMOL	-	4P	2
			UCAE210	Qlik View	-	4P	2

EXTRA CREDIT EARNING PROVISION

Semester	Part	Category	Course Code	Course Title	Contact/ Week	Credit	
II	III	Summer Internship	UCAI201	Summer Internship	-	-	1
IV	III	Summer Internship	UCAI401	Summer Internship	-	-	1
V	III	Self Study	UCSS501/ UCAS501	Python Programming	2	1	1
V	III	Self Study	UCSS502/ UCAS502	Android Applications	2	1	1
VI	III	Self Study	UCSS601/ UCAS601	Angular JS	2	1	1
VI	III	Self Study	UCSS602/ UCAS602	Green Computing	2	1	1

Inclusion of Experiential Learning

A. Experiential Learning (Mandatory)

Course Mapping				Collaborating Agency - MSME		
Sem	Course Code	Course Title	Assessment	Course Title	Hours/ Days / Month	Mode of Evaluation
II	UCAM310	Java Programming	Component III	Java Programming	4 Days	Reflection
II	UCAM407	Python Programming	Component III	Python Programming	4 Days	Reflection

				Training		
III	UCAM505	Web Programming	Component III	Web designing Certification	4 Days	Reflection
III	UCAM610	Computer Graphics	Component III	Computer Graphics Certification	4 Days	Reflection

B. Skill Orientation Programme (Only for Interested students) – Extra Credit Earning Provision

Sem	Category	Course Code	Course Title	Collaborating Agency	Hours/ Days/Month	Mode of Evaluation	Credits (Min/Max)
V	Core	UCAT501	Excel Analytics with R-Language	**MSME**	4 Days	Reflection	1

OPERATING SYSTEM
UCAM507

Semester : V   **Credits : 5**
Category : Core X   **Hours/Week : 5**
Class & Major : III BCA   **Total Hours : 65**

Objectives
To enable the students
- Acquire knowledge on basics of operating system.
- Analyze the various scheduling algorithms in process and memory management.
- Exposure to Linux Operating System.

Learning Outcomes
On Completion of the course, the students will be able to
- Describe the important computer system resources and the role of operating system in their management policies and algorithms.
- Understand the process management policies and scheduling of processes by CPU
- Evaluate the requirement for process synchronization and coordination handled by operating system

UNIT – I OVERVIEW OF OPERATING SYSTEM   13 Hrs
Operating system – Types of Computer Systems Computer-System operation – I/O structure – System components – System calls – System programs – Process concept – Process scheduling – Operations on processes –Inter process communication – Multithreading models – Threading issues.

UNIT – II PROCESS MANAGEMENT   **13 Hrs**
   Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation – Process Scheduling Models - Synchronization hardware – Semaphores – Classic problems of synchronization – Deadlock characterization – Methods for handling deadlocks – Recovery from deadlock.

UNIT – III MEMORY MANAGEMENT   **13 Hrs**
   Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing.

UNIT – IV FILE CONCEPT   **13 Hrs**
   Access methods – Directory structure – File-System Mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management.

UNIT – V THE LINUX SYSTEM   **13 Hrs**
   History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Security.

Text Books
- Silberschatz, Galvin and Gagne. (2013). *Operating System Concepts*. John Wiley & Sons Inc. (8th ed.,) .New Delhi.
- Richard Fox. (2014). *Linux with Operating System Concepts.* Pearson Education.(2nd ed.,).

Reference Books
- Andrew, S. Tanenbaum. (2013).*Operating system Design and Implementation. (*4 the ed.,) PHI. New Delhi.
- Deital, H.M. Deital,P.J and Choffnes, D.R.(2013).*Operating Systems*. Pearson Education. New Delhi.

E-Resources
- http://www.w3schools.com
- http://www.youtube.com

SOFTWARE ENGINEERING
UCAM509

Semester : V	**Credits** : 4
Category : Core XI	**Hours/Week: 5**
Class & Major: III BCA	**Total Hours : 65**

Objectives
To enable the students
- Introduce the basic concepts of Software Engineering and the various phases in Software development
- Understand User Conceptual Models and Interface Design.
- Specification of participatory design & interactive debugging.

Learning Outcomes
On Completion of the course, the students will be able to
- Define various software application domains and remember different process model
- Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
- Convert the requirements model into the design model and demonstrate use of software and user interface design principles.

UNIT-I INTRODUCTION   13 Hrs
Introduction to Software Engineering –Software –The changing nature of the software. A Generic view of Process: Software Engineering Layered Technology –A Process Framework – Personal & Team Process Models. Process Models: Waterfall –Incremental –Evolutionary – Specialized process models –Agile Process Models.

UNIT-II REQUIREMENT ENGINEERING   13 Hrs
Requirement Engineering: Requirement engineering task-Eliciting requirements – Building Analysis Model –Data Modeling Concepts-Flow oriented modeling–Class Based Modeling. Design Engineering: –Design Concepts –Design Models –Data design-Architectural Design.

UNIT-III USER INTERFACE DESIGN   13 Hrs
Modeling Component Level Design: –Component –Designing Class-Based Components –Conducting Component-Level Design. Performing User Interface Design: Golden Rules –User Interface Analysis & Design –Interface Design Steps –Design Evaluation.

UNIT-IV TESTING STRATEGIC   13 Hrs
Testing Strategies –A Strategic Approach to Software Testing –Strategic Issues –Test Strategies for Conventional & Object Oriented Software –Validation Testing –System Testing – The Art of Debugging Testing Tactics –Software Testing Fundamentals –Black Box and White Box Testing –Basis Path Testing –Control Structure Testing.

UNIT-V LEVELS OF TESTING   **13 Hrs**

The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – System Testing –Types of system testing -Acceptance testing –Performance tests - Regression Testing –Internationalization testing –Ad-hoc testing -Alpha –Beta Tests –Testing OO systems –Usability and accessibility is testing.

Text Book
- Roger, S. Pressman, (2005).*A Practitioner's Approach Software Engineering*. (6th ed.,). McGraw Hill International Edition.

Reference Books
- Sommerville, I. (1983). *Software Engineering*. (5th ed.,) Addison Wesley. McGraw Hill.
- David Gustafson. (2003). *Software Engineering.* Schaum's outlines. Tata McGraw –Hill.
- Waman, S. Jawadekar. (2004). *Software Engineering: Principles and Practice.* McGraw Hill.

E-Resources
- http://www.w3schools.com
- http://www.youtube.com

WEB PROGRAMMING
UCAM505

Semester : V	**Credit** : 5
Category : Core XII	**Hours / Week** : 6
Class & Major: III BCA	**Total Hours** : 78

Objectives:
To enable the students
- Understand the concepts of web programming languages.
- Analyze the various controls for designing web applications.
- Develop the web applications using .Net Technologies.

UNIT - I HTML AND JAVASCRIPT   **16 Hrs**

World Wide Web – XHTML - Cascading style sheet- JavaScript – Date – Array - Pattern matching using regular expressions - Dynamic documents with java script.

UNIT - II .NET FRAMEWORK AND APPLICATION STRUCTURE   **16 Hrs**

Introduction to .NET - Benefits of .NET Framework - Structure of an Application - The Application Domain - The Application Lifetime - The Application Directory Structure - The Global. asax Application File - Using States - HTTP Handlers - Postback and Cross-Page Posting.

UNIT - III WEB STANDARD CONTROLS   **16 Hrs**

The Control Class - The Web Control Class - Label - Button – Text Box - Literal – Place Holder – Hidden Field – File Upload - Image – Image Button – Image Map – List Box – Drop Down List – Bulleted List – Hyper Link – Link Button – Check Box – Check Box List – Radio Button – Radio Button List – Table – Panel – Wizard - Xml – View – Multi View – Substitution – Localize – Calendar – AdRotator.

UNIT - IV OTHER WEB CONTROLS   **15 Hrs**

Navigation Controls: Tree View – Menu – Site Map Path - Validation Controls: Base Validator – Field Validator- Range Validator – Regular Expression Validator – Compare Validator – Custom Validator – Validation Summary.

UNIT - V DATABASE CONTROLS   **15 Hrs**

Working with Database Controls: Grid View - DataList - Details View - Form View – List View- Repeater – Data Pager – Chart – Query Extender –SqlDataSource – Access DataSource - LinqDataSource – Object DataSource – Xml DataSource – Entity DataSource – SiteMapDataSource.

Text Books

- Bayross,I. (2010).*Web enabled commercial Application Development using HTML.DHTML. Javascript*. Perl CGI. BPB Publications. New Delhi.
- Kogent Learning Solutions Inc. (2012). *ASP.NET 4.0 Black Book*. Dream tech Press publications.

Reference Book

- Kogent Learning Solutions Inc. (2011*).NET 4.0 programming (6-in-1) Black Book*. Dreamtech Press publications.

E-Resources
- http://www.w3schools.com
- http://www.youtube.com

OPEN SOURCE TECHNOLOGY
UCAM508

Semester : V	**Credit** : 5
Category : Core XIII	**Hours/Week** : 6
Class & Major : III BCA	**Total Hours** : 78

Objectives

To enable the students

- Understand the concept of Asynchronous Calls to Web server
- Manipulate WebPages in an efficient manner
- Develop website with dynamic changes

Learning Outcomes

On Completion of the course, the students will be able to

- To provide a basic idea of open source technology and their software development process
- To understand the role and future of open source software
- Develop web page with dynamic changes

UNIT – I INTRODUCTION   15 Hrs

Introduction- Open source-PHP – History – features – Variables – Statements – Operators Conditional statements – if – switch – Nesting conditions – Merging forms with conditional statements – Loops –while – do – for – Loop iteration with break and continue.

UNIT – II ARRAYS AND FUNCTIONS   15 Hrs

Arrays: Creating an array – Modifying array – Processing array – Grouping form with arrays – Using array functions – Creating user defined functions – Using files – Sessions – Cookies – Executing external programs – Creating sample applications using PHP.

UNIT – III MYSQL   16 Hrs

Effectiveness of MySQL – MySQL Tools – Prerequisites for MySQL connection – Databases and tables – MySQL data types – Creating and manipulating tables – Insertion, updation and deletion of rows in tables – Retrieving data – Sorting and filtering retrieved data – Advanced data filtering – Data manipulation functions – Aggregate functions – Grouping data – Sub queries – Joining Tables – Set operators – Full text searching.

UNIT – IV PHP WITH MYSQL   15 Hrs

Working MySQL with PHP – database connectivity – usage of MYSQL commands in PHP, processing result sets of queries – handling errors – debugging and diagnostic functions – validating user input through Database layer and Application layer – formatting query output with Character, Numeric, Date and time – sample database applications.

UNIT – V JQUERY USER INTERFACE   **17 Hrs**

　　　　Intro to jQuery UI – Need of jQuery UI in real web sites – Downloading and Importing jQuery UI – Draggable – Droppable – Resizable – Selectable – Sortable – Accordion – Auto Complete – Date Picker – Dialog – Menu – Progress Bar – Slider – Spinner – Tabs – Tooltip – Color Animation – Easing Effects – addClass – remove Class – Effects – jQuery UI themes – Customizing jQuery UI widgets / plug-ins – jQuery UI with CDN – Consuming jQuery Plug-– Regular expressions.

Text Books
- VikramVaswani . (2005). *PHP and My SQL*.Tata McGraw-Hill.
- Ben Forta. (2006). *MySQL Crash course* .SAMS.
- Dan Wellman. (2008). *J Query UI 1.8: The User Interface Library for J Query*. Packt Publishing. Brimingham–Mumbai.
- Rebecca Murphey. (2009). *J Query Fundamentals*.Superhero Labs Publisher.(1st ed.,).

Reference Books
- Tim Converse, Joyce Park and Clark Morgan. (2008). *PHP 5 and MySQL*. Wiley India reprint.
- Robert Sheldon, Geoff Moes. (2005).*Beginning MySQL*.Wrox.

E-Resources
- http://www.w3schools.com
- http://www.youtube.com
- https://www.techopedia.com

OPEN SOURCE TECHNOLOGY – PRACTICAL
UCAR506

Semester : V	**Credit**	: 2
Category : Core Practical VI	**Hours/Week**	: 3
Class & Major : III BCA	**Total Hours**	: 39

Objectives
To enable the students
- Develop an interactive and secured web application
- Reduce the code to build user interface application

Learning Outcomes

On Completion of the course, the students will be able to
- Develop an interactive and secured web application
- Reduce the code to build user interface application
- Ability to develop applications

Lab Exercise

PHP

1. Creating simple webpage using PHP
2. Use of conditional statements and looping statements in PHP
3. Creating different types of arrays
4. Creating user defined functions
5. File manipulation using PHP
6. Creation of sessions
7. Creation of cookies

MySQL

1. Creating simple table with constraints
2. Insertion, Updation and Deletion of rows in MYSQL tables
3. Demonstration of joining tables
4. Usage of subqueries
5. Usage of aggregate functions
6. Working with string, numeric and date functions

WEB PROGRAMMING – PRACTICAL
UCAR505

Semester	**: V**	**Credits**	**: 2**
Category	**: Core Practical VII**	**Hours/Week**	**: 3**
Class & Major	**: III BCA**	**Total Hours**	**: 39**

Objectives:
To enable the students
- Understand the real time requirements of web based programs.
- Explore the functionalities of web tools.
- Develop the client-server architecture.

Lab Exercises:

1. Create a Calculator program using JavaScript.
2. Create a web page using Image map and calendar control.
3. Create a web page using File Upload, Hyperlink and Link button.
4. Creating and Using a Simple User Control.
5. ADO.NET application to insert, delete, update records in database.
6. Create a simple web page using all validation controls.
7. Create a web page using AdRotator & menus.
8. Create a web page using grid view, form view, detail view and list view.
9. Data List and Repeater control.
10. Create a web page to manage the session.

DATA MINING
UCAM609

Semester : VI	**Credit** : 4
Category : Core XIV	**Hours/Week** : 5
Class & Major : III BCA	**Total Hours** : 65

Objectives
To enable the students
- Understand the Data Preprocessing Techniques.
- Analyse the various algorithms in Data Mining.
- Extract the data using classification and cluster algorithms in the research field.

Learning Outcomes
On Completion of the course, the students will be able to
- Organize and Prepare the data needed for data mining using pre preprocessing techniques
- Define and apply metrics to measure the performance of various data mining algorithms.
- Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.

UNIT – I INTRODUCTION 13 Hrs

Data Mining tasks – Data Mining versus Knowledge Discovery in Data bases – Relational databases – Data warehouses – Transactional databases – Object oriented databases – Spatial databases – Temporal databases – Text and Multimedia databases – Heterogeneous databases - Mining Issues.

UNIT - II DATA PREPROCESSING 13 Hrs

Data Preprocessing – Data cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization.

UNIT - III DATA MINING TECHNIQUES 13 Hrs

Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining.

UNIT - IV CLASSIFICATION AND PREDICTION 13 Hrs

Classification and Prediction – Issues– Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy.

UNIT - V CLUSTERING TECHNIQUES 13 Hrs

Cluster Analysis – Clustering Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Introduction to Advanced Topics: Web Mining, Spatial Mining and Temporal Mining.

Text Book

- Jiawei Han and Micheline Kamber. (2012). *Data Mining Concepts and Techniques*. Elsevier. (3rded.,) .

Reference Books

- Alex Berson and Stephen J.Smith. (2016). *Data Warehousing, Data Mining & OLAP*. Tata McGraw Hill Edition. 35th Reprint.
- Ian Witten Eibe Frank Mark Hall. (2011). *Data Mining. Practical Machine Learning Tools and Techniques*. (3rded.,).

E-Resources

- https://www.microstrategy.com
- https://www.techopedia.com

COMPUTER GRAPHICS
UCAM610

Semester : VI	**Credits : 4**
Category : Core XV	**Hours/Week : 4**
Class & Major: III BCA	**Total Hours : 52**

Objectives:
To enable the students

- Acquire Knowledge on two and three dimensional graphical structures.
- Analyze the Multimedia compression and animations.
- Design 2D and 3D objects for animation.

Learning Outcomes
On Completion of the course, the students will be able to

- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- To describe the importance of viewing and projections.
- To define the fundamentals of animation, virtual reality and its.

UNIT – I 2D PRIMITIVES   **10 Hrs**

A survey of Computer Graphics – Overview of Graphic systems – Elements of pictures created in computer graphics – Graphics input primitives and devices Drawing primitives in open GL and Basic open GL programming – open GL basic Graphics primitives – Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives.

UNIT – II 2D GEOMETRIC TRANSFORMATIONS   **10 Hrs**

2D Viewing – Window-Viewport Transformation – Two dimensional Geometric transformations – Line, Polygon, Curve and Text clipping algorithms.

UNIT – III 3D CONCEPTS   **12 Hrs**

Projections – Three dimensional object representation – Parallel and Perspective
Polygons, 69 Splines, Quadric Surfaces – Visualization of data sets – 3D affine transformations
3D Rotations using Quaternions – Viewing – Visible surface identification – Color Models, 3D
Transformations in open GL.

UNIT – IV VISIBLE SURFACE DETECTION METHODS   **10 Hrs**

Visible surface detection methods: Classification, back-face detection,
scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.
depth-buffer,

UNIT – V COMPUTER ANIMATION   **10 Hrs**

Flash Simple Programs: key frame systems, motion ,Frame–By-Frame Animation–Motion
Tweening – Shape Tweening – Text Animation – 3D Animation.

Text Books
- Donald Hearn,D. Pauline Baker and Warren Carithers. (2010).*Computer Graphics with OpenGL.* Pearson Education. (4thed.,).
- Foley, VanDam, Feiner and Hughes.(2009). *Computer Graphics Principles & practice*. Pearson Education. (2nd ed.,).

Reference Book
- F.S.Hill,(2010). *Computer Graphics using OPENGL*. Pearson Education. (2nd ed.,).

E-Resources
- http://www.w3schools.com
- http://www.youtube.com
- http://www.nptel.ac.in /courses/106106090
- http://www.nptel.ac.in /courses/106102063

BASICS OF IOT
UCAM611

Semester : VI	**Credits** : 3
Category : Core XVI	**Hours/Week :** 4
Class & Major : III BCA	**Total Hours :** 52

Objectives
To enable the students
- Understand the basic issues, policy and challenges in the Internet.
- Examine the components and the protocols in Internet.
- Build a small low cost embedded system with the Internet

Learning Outcomes
On Completion of the course, the students will be able to
- Interpret the vision of IOT from a global context.
- Determine the Market perspective of IOT.
- Compare and Contrast the use of Devices, Gateways and Data Management in IOT

UNIT - I INTRODUCTION   10 Hrs

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

UNIT - II PROGRAMMING THE MICROCONTROLLER FOR IOT   10 Hrs

Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors.

UNIT – III RFID AND INFORMATION TECHNOLOGY INTEGRATION   12 Hrs

What Is RFID? - The Three Core Components of an RFID System - RFID Tags - RFID Interrogators - RFID Controllers - What Is RFID Middleware? - The Recent Focus on Middleware - Core Functions of RFID Middleware - Middleware as Part of an RFID System— The EPC Architecture - The Present State of Middleware Development - Middleware Vendors.

UNIT – IV MACHINE-TO-MACHINE INTERACTIONS   10 Hrs

Introduction - Types of IoT interaction - Basic local M2M interactions - Cloud M2M with IFTTT - M2M alarm system - Automated light controller - Automated sprinkler controller - Troubleshooting basic M2M issues

UNIT V CASE STUDIES AND REAL-WORLD APPLICATIONS10Hrs Real World Applications : - Asset management-Industrial automation- smart grid,

Commercial building automation - Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloud for IoT - Amazon Web Services for IoT-Simple Programs using sensors.

Text Books
- Charalampos Doukas. (2002). *Building Internet of Things with the Arduino*. Create space.
- V. Daniel Hunt. (2007). Albert Puglia, Mike Puglia - *Rfid-A Guide To Radio Frequency Identification*. Wiley.
- Marco Schwartz. (2016)*. Internet of Things with Arduino Cook book*. Packt Publishing.
- Olivier Hersent, David Boswarthick, Omar Elloumi. (2012). *The Internet of Things– Key applications and Protocols*.Wiley.

References Book
- Luigi Atzor et.al. (2010).*The Internet of Things: A survey Journal on Networks*. Elsevier Publications.

E-Resources
- http://postscapes.com/
- http://www.theinternetofthings.eu/what-is-the-internet-of-things

DATA MINING –PRACTICAL
UCAR602

Semester : VI	**Credits** : 3	
Category : Core Practical VIII	**Hours/Week** : 4	
Class &Major :III BCA	**Total/Hours** : 52	

Objectives
To enable the students
- Understand the concepts in Data mining.
- Apply programming skills in Weka tool.
- Analyze the dataset.

Learning Outcomes
On Completion of the course, the students will be able to
- The data mining process and important issues around data cleaning, pre-processing and integration.
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.

LIST OF PROGRAMS

Create a Dataset with 'n' number of tuples for the following

1. Student Details

2. Super Market Details

3. Library Details

4. Employee Details

6. Customer Details

7. Recruitment Details

8. Patient Details

9. Weather Details

10. Social Networking Reviews Details

To implement the Dataset in WekaTool

1. Pre-Processing on Dataset

2. Normalize Table data using Knowledge Flow.

3. Association Rule Process on Dataset
   - A Priori Algorithm

4. Construct Decision Tree process on Dataset

   - ID3 Agorithm

   - Naïve Bayes Algorithm

5. Cross-validation process on Dataset

   - J 48 Algorithm

6. Clustering Rule process of Dataset

   - Simple K-eans Algorithm.

7. Data Visualization

FUNDAMENTALS OF SECURITY
UCAO606

Semester : VI	**Credit** : 4
Category : Major Elective	**Hours/Week : 5**
Class & Major : III BCA	**Total Hours : 65**

Objectives
To enable the students
- Understand the Cryptography and Network Security concepts and application.
- Acquire knowledge in various types of Encryption and Decryption mechanism.
- Classify and evaluate computer and security threats and models.

Learning Outcomes
On Completion of the course, the students will be able to
- Understand the Cryptography and Network Security concepts and application.
- Acquire knowledge in various types of Encryption and Decryption mechanism.
- Classify and evaluate computer and security threats and models.

UNIT – I NETWORK SECURITY   **13 Hrs**

The concepts of Security- the Need for Security - Security Approaches- Principles of Security Types of Attacks. Convention Encryption: Conventional Encryption Mode- Steganography- Classical Encryption Techniques - Simplified DES- Block Cipher Principles - The Data Encryption Standard - The Strength of DES - Differential and Linear Crypt analysis - Block Cipher Design Principles - Block Cipher Modes of operation - Conventional Encryption algorithms.

UNIT – II CYBER SECURITY   **12 Hrs**

Overview of Cyber Security, Introduction to Cyber Security – Goals of Cyber Security – Computer Forensics – Steganography – Cyber Crime – Vulnerability Assessment. Internet Governance – Challenges and Constraints, Cyber Threats:- Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Need for a Nodal Authority, Need for an International convention on Cyberspace.

UNIT – III INFORMATION SECURITY   **12 Hrs**

The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Defense, Elementary Cryptography: Substitution Ciphers, Transpositions, Making "Good" Encryption algorithms, The Data Encryption Standard, The AES Encryption Algorithms, Public Key Encryptions, Uses of Encryption.

UNIT - IV DEVELOPING APPLICATIONS   **15 Hrs**

Authentication Applications - Kerberos - x509 authentication service - public key Infrastructure (PKI) - Electronic Mail Security - Pretty Good Privacy - S/MIME - IP Security - IP Security Overview - IP Security Architecture - Authentication Header - Encapsulating

payload - combining security association - Key Management - Web Security - Web Security Considerations - Secure Socket Layer & Transport Layer Security - Secure Electronic Transaction - Introduction to Wireless security.

UNIT - V INTRUDERS, VIRUSES, WORMS   13 Hrs

Intruders - Intrusion detection - password management - Viruses and Related Threats - Distributed Denial of service attacks - Firewall Design Principles - Trusted Systems - virtual private network (VPN).

Text Books
- William Stallings. (2013). *Cryptography and Network Security*. Prentice Hall .(6th ed.,).
- AtulKahate. (2013).*Cryptography and Network Security*.Tata McGraw-Hills.

Reference Books
- Neal Krawetz. (2007). *Introduction to Network Security*. Thomson Business Press.
- Eric Maiwald. (2004). *Information Security Series. Fundamental of Network security*. Dreamtech press.

E– Resources
- http://www.nptel.ac.in
- https://www.csoonline.com

CLOUD COMPUTING
UCAO604

Semester : VI	**Credits** : 4
Class & Major: III BCA	**Hours/week : 5**
Category : Major Elective	**Total Hours : 65**

Objectives
To enable the students
- Understand the evolution of cloud computing and its services.
- Design and development of simple cloud service.
- Apply the applications of cloud computing in various services.

UNIT – I INTRODUCTION   **12 Hrs–**

    Cloud-definition, benefits, usage scenarios, History of Cloud Computing Cloud Architecture - Types of Clouds - Business models around Clouds – Major Players in Cloud Computing - issues in Clouds - Eucalyptus - Nimbus - Open Nebula, CloudSim.

UNIT – II CLOUD SERVICES   **13 Hrs**

    Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google, Amazon, Microsoft Azure, IBM, Salesforce.

UNIT – III COLLABORATING USING CLOUD SERVICES   **15 Hrs**

Email Communication over the Cloud - CRM Management - Project Management- Event Management - Task Management – Calendar - Schedules - Word Processing – Presentation – Spreadsheet - Databases – Desktop - Social Networks and Groupware.

UNIT – IV VIRTUALIZATION FOR CLOUD   **13 Hrs**

    Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System VM, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT – V SECURITY, STANDARDS AND APPLICATIONS   **12 Hrs**

    Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Text Book

- John Ritting house & James Ransome. (2010). *Cloud Computing . Implementation Management and Strategy*. CRC Press.

Reference Books

- David E.Y. Sarna. (2011). *Implementing and Developing Cloud Application*. CRC press.
- Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draf. *(2011). Cloud computing synopsis and recommendation*.
- Anthony T Velte, Toby J Velte, Robert Elsenpeter. (2010). *Cloud Computing : A Practical Approach*. Tata McGraw-Hill.
- Michael Miller. (2008). *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate.* Que Publishing.

III and IV Evaluation Components of CIA

Semester	Part	Category	Course Code	Course Title	Component III	Component IV
V	III	Core X	UCAM507	Operating System	Case Study	Seminar using ICT Technique
	III	Core XI	UCAM509	Software Engineering	System Modeling	Seminar using ICT Technique
	III	Core XII	UCAM505	Web Programming	Program Writing	Webpage Design
	III	Core XIII	UCAM508	Open Source Technology	Problem Solving	Developing Web pages
	III	Core Practical VI	UCAR506	Open Source Technology Practical	DPA	Viva-voce
	III	Core Practical VII	UCAR505	Web Programming Practical	DPA	Viva-Voce
VI	III	Core XIV	UCAM609	Data Mining	Database Design	Seminar using ICT Technique
	III	Core XV	UCAM610	Computer Graphics	Simple Animation	Seminar
	III	Core XVI	UCAM611	Basics of IOT	Working Model	Simple programs
	III	Core Practical VII	UCAR602	Data Mining Practical	DPA	Viva-voce
	III	Major-Elective	UCAO606	Fundamentals of Security	Case Study	Seminar
	III	Major-Elective	UCAO604	Cloud Computing	Working Model	Seminar