1.1.3 & 1.2.1 MCA courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year July 2021 to June 2022.

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Big Data Analytics	20ECAC801

Course Code: **20ECAC801**	Course Title: **Big Data Analytics**	
L-T-P: 3-0-1	Credits: 4	Contact Hrs: 5
ISA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 40+24		Exam Duration: 3 hrs

No	Content	Hrs
	Unit I	
1	**Chapter 1: Types of digital data and concept of big data** Classification of digital data: Unstructured, Semi-structured, and Structured; Characteristics of data, Evolution of big data, and definition of big data: 5 Vs, challenges with big data, typical data warehouse environment: Hadoop Environment.	4
2	**Chapter 2: Big Data Analytics** What is big data analytics? What big data analytics is not? Classification of analytics, Top challenges facing big data, Importance of big data analytics, Need of technology to meet big data challenges, Data science: business acumen skills, technology expertise, mathematics expertise, Data scientist, terminologies used in big data environments, BASE, top analytics tools.	8
3	**Chapter 3: Big data technology landscape** Not Only SQL (NOSQL): Types of NoSQL, Advantages of NoSQL, Use of NoSQL in industry, NewSQL, Hadoop: features, key advantages, versions, overview of Hadoop ecosystem, Hadoop distributions, Hadoop versus SQL, Cloud-based Hadoop solutions.	4
	Unit II	
4	**Chapter 4: Hadoop distributed file system** Introduction, Why Hadoop, RDBMS versus Hadoop, distributed computing challenges: hardware failure, how to process gigantic store of data, history of Hadoop, Hadoop overview, use case of Hadoop, Hadoop distributors, Hadoop Distributed File System (HDFS): Name node, Data node, secondary Name node, anatomy of file read, anatomy of file write; replica placement, processing of data with Hadoop, Managing resources an applications with Hadoop, Interacting with Hadoop ecosystem.	8 Hrs
5	**Chapter 5: MongoDB and query language** Introduction, Why MongoDB, Terms used in RDBMS and MongoDB, data types in MongoDB, MongoDB query language: basic functions, Arrays, aggregate functions, MapReduce function, Java script programming, Cursors in MongoDB, MongoImport and MongoExport.	4 Hrs
6	**Chapter 6: Cassandra and MapReduce programming** Introduction, Apache Cassandra, features of Cassandra, data types, CQLSH, Keyspaces, CRUD operations, Introduction to MapReduce, Mapper, Reducer, Combiner, partitioner, searching, Sorting, and compression.	4 Hrs
	Unit – III	
7	**Chapter 7: Hive and query language** Introduction, What is Hive, History of Hive and recent releases of Hive, Hive integration and work flow, Hive data units; Hive architecture, Hive data types, Hive file format, Hive Query Language (HQL): DDL, DML, Hive shell, database,	4 Hrs

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tables, Partitions, Bucketing, Views, Sub-query: RCFile implementation, SERDE, User defined function.

8	**Chapter 8: PIG**	**4 Hrs**

Introduction, What is PIG, Key features of PIG; The anatomy of PIG, PIG philosophy, use case for PIG: ETL processing, PIG Latin overview, Data types in PIG, Running PIG, execution modes of PIG, HDFS commands, relational operators, eval function, complex data types, piggy bank, user defined function.

Text Book

1. Seema Acharya, Subhashini Chellapan, Big Data and Analytics, First edition, 2015, Wiley publications.

References

1. EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley Publications.
2. Frank J Ohlhorst, Big Data Analytics: Turning Big Data into Big Money‖, Wiley and SAS Business Series, 2012.
3. Colleen Mccue, Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis‖, Elsevier, 2007.
4. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
5. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics‖, Wiley and SAS Business Series, 2012.
6. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data‖, McGraw Hill, 2011.
7. Jiawei Han, Micheline Kamber, Data Mining Concepts and Techniques‖, Second Edition, Elsevier, Reprinted 2008.

ACTIVITY

#	TOPICS	ACTIVITY	WEIGHTAGE
1	Types of digital data and concept of big data	Identify the various types of data, such as, SD, USD and SSD present in any given business and also justify its importance for business growth. Prepare technical report for the same.	10
2	Big Data Analytics	Prepare survey paper on BDA with issues, challenges and applications.	10
3	Big data technology landscape	Demonstration of graph database management system using Neo4j and Cypher query language. Data set: Movie database, Twitter followers database, Twitter Sentiment Graph Data, Graph dataset in Kaggle.	20
4	Hadoop distributed file system	Demonstration of HDFS commands	20

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		Hadoop Implementation of MapReduce programming for Word count problem, Totals sales and Max temperature problem.	
5	MongoDB and query language	Demonstration of CRUD operations in MongoDB. MongoDB built-in functions and UDF Implementation of MapReduce functions in MongoDB for log data analysis. Integration of JavaScript with MongoDB, Loading of large data into MongoDB	15
6	Cassandra No SQL database	Cassandra Keyspace Operations Cassandra Table Operations Cassandra CURD Operations Cassandra CQL operations & Data Expiration using TTL (Example) Cassandra Collection: Set, List, Map with Example	10
7	Hive and query language	Hive CRUD operations Hive – Partitioning Hive - View and Indexes HiveQL operations Hive Function: Built-in & UDF (User Defined Functions) Hive ETL: Loading JSON, XML, Text Data Examples	15
8	PIG	Apache Pig - Grunt Shell demonstration Pig Latin – Demonstration Apache Pig - Reading Data Apache Pig - Storing Data Pig Latin: Built in Functions and UDF MapReduce implementation	10
		Total	**100**

Evaluation Scheme

1.   **In Semester Assessment (ISA)**

Assessment	Marks
ISA- 1	15
ISA- 2	15
Activities	20
ISA	50
ESA	50
Total	100

2.   **End Semester Assessment (ESA)**

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2, 3	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	4, 5,6	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	7,8	Any 1 question is to be answered

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Programming using C# with .Net	20ECAC802

Course Code: **20ECAC802**	Course Title: **Programming Using C# with .NET**	
L-T-P: 3-0-1	Credits: 4	Contact Hrs: 5
ISA Marks: 50	ESA Marks: 50	Total Marks: 100
Teaching Hrs: 40+24		Exam Duration: 3 hrs

Content	Hrs

Unit – 1

Chapter No. 1.The Philosophy of .NET	6 hrs

Understanding the Previous State of Affairs, The .NET Solution, Introducing the Building Blocks of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Assemblies, The Role of the Common Intermediate Language , The Role of .NET Type Metadata, The Role of the Assembly Manifest, Compiling CIL to Platform –Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime, The Assembly/Namespace/Type Distinction, Using ildasm.exe, Deploying the .NET Runtime, The Platform independent nature of .NET, Installing the .NET Framework, C# Command-Line Compiler, Building C# Applications using csc.exe, Working with csc.exe Response Files.

Chapter No. 2.C# Language Fundamentals.	5 hrs

The Anatomy of a Simple C# Class, An Interesting Aside : The System.Environment Class, Defining Classes and Creating objects, The System.Console Class, Establishing Member Visibility, Default Values of Class Member Variables, Member Variable Initialization Syntax, Defining Constant Data, Defining Read-only fields, Understanding the static keyword, Method Parameter Modifiers, Iteration Constructs, Decision Constructs and the Relational/Equality Operators, Understanding Value Types and Reference Types, Understanding Boxing and Unboxing Operations, Working with .NET Enumerations, The Master Class: System.Object, Overridding some default behaviours of System.Object, The System Data types(and C# Shorthand notation), The System.String data types, The role of System.Text.StringBuilder, .NET Array Types, Understanding C# Nullable Types, Defining Custom Namespaces

Chapter No. 3. Object-Oriented Programming with C#	5 hrs

Understanding the C# Class Type, Reviewing the Pillars of OOP, The First Pillar: C#'s Encapsulation Services, The Second Pillar: C#'s Inheritance Support, Programming for Containment/Delegation, The Third Pillar: C #'s Polymorphic Support, C# Casting rules, Understanding C# Partial types, Documenting C# Source Code via XML

Unit – 2

Chapter No. 4.Object Lifetime and Exceptions Handling.	6 hrs

Classes, Objects and References, the basics of Object Lifetime, The role of Application Roots, Understanding Object Generations, System.GC type, Building Finalizable Objects, Building Disposable Objects, Building Finalizable and Disposable types. Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, The Simplest possible example, Configuring the state of an exception, System – Level Exception (System. System Exception), Application-Level Exception (System.ApplicationException), Processing Multiple Exception, The Finally Block, The result of unhandled exceptions, Debugging Unhandled exceptions using VS. NET.

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Chapter No. 5.Interfaces and Collections   5 hrs

Defining Interfaces in C#, Implementing an Interface in C#, Contrasting Interfaces to Abstract Base Classes, Invoking Interface Members at the Object Level, Interfaces As Parameters, Interfaces As Return Values, Arrays of Interfaces Types, Understanding Explicit Interface Implementation, Building Interface Hierarchies, Implementing Interfaces Using Visual Studio 2005, Building Enumerable Types(IEnumerable and IEnumerator),

Building CloneableObjects(IConeable), Building Comparable Objects(IComparable), The Interfaces of the System.Collections Namespace, The Class Types of System.Collections.

Chapter No. 6.Callback Interfaces, Delegates, and Events, Advanced C#   5 hrs
Techniques

Understanding Callback Interfaces, Understanding the .NET Delegate type, Defining a Delegate in C#, The System.multicastDelegate and System.Delegate Base Classes, Investigating a Delegate Object, Delegates as Parameters, Understanding C# Events Building a Custom Indexer, Internal Representations of Type Indexers: Final Details, Understanding Operator Overloading Binary Operators, Unary Operators, Equality Operators, Comparison Operators, Understanding Custom Type Conversions, The Advanced Key words of C#, C# Preprocessor Directives.

Unit – 3

Chapter No. 7.Programming with Windows Forms.   4 hrs

Controls - Labels, Text boxes, Masked Text boxes, Buttons, Check boxes, Radio Buttons, Group Boxes, Checked List Boxes, List Boxes, Combo Boxes, Configuring the Tab Order, Setting the Form's Default Input Button, Working with more Exotic Controls – Month Calendars, Tool Tips, Tab Controls, Track Bars, Panels, Up Down Controls, Error Providers, Tree Views, Web Browsers, Building Custom Windows Forms Controls – Creating Images, Building Design-Time UI, Defining Custom Events, Defining Custom Properties.

Chapter No. 8. Database Access with MSSQL Server   4 hrs

Overview of Data Access, Creating database connections, connecting to MSSQL Server,

Dataset and Data table features, using inline SQL Statements, using stored procedures ,

Executing select commands, SQL transaction

Text Book:

1. Andrew Troelsen: Pro C# with .NET 3.0, Special Edition, Dream tech Press, India, 2007.Chapters: 1 to 11 (up to pp.389, except Chapter 10)

References:

1. .NET 4.0 Programming (6-in-1),Black Book,Kogent Learning Solutions Inc.Wiely-Dream Tech Press
2. Tom Archer: Inside C#, WP Publishers, 2001.
3. Herbert Schildt: The Complete Reference C#,Tata McGraw Hill, 2004

1.1.3 & 1.2.1 MCA courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year July 2021 to June 2022.

Activities			
#	Topics	ACTIVITY	WEIGH
1	The Philosophy of .NET	• Installing .NET and CSC.EXE compiler. • Working with CSC.EXE compiler. • Installing Visual Studio IDE. • Understanding .NET Environment.	1
2	C# Language Fundamentals.	• Programs on static variables, functions, class, and method parameter modifiers. • Programs on Boxing and Unboxing. • Creating custom namespace.	1
3	Object-Oriented Programming with C#	• Implementation of Encapsulation, Inheritance and Polymorphism concepts using Banking or Insurance case studies. • Programs on partial types, and casting.	1
4	Object Lifetime and Exceptions Handling	• Programs on Exception handling. • Programs on object life time.	
5	Interfaces and Collections	• Implementation of interface and collections using Banking or Insurance case studies. • Creating own interface and Interface Hierarchies.	1
6	Callback Interfaces, Delegates, and Events, Advanced C# Techniques	• Implementation of callback interface, delegates and events using basic functionality of vehicle. • Programs on Advanced C# Techniques like operator overloading, custom indexer and preprocessor directives	2
7	Programming with Windows Forms.	• Implementing windows form application for HRMS user interface design. • Creating custom controllers. • Understanding MVC Pattern. • Working with ASP.NET controllers.	2
8	Database Access with MSSQL Server	• Implementing session management in ASP.NET web application. • Developing an ASP.NET web application to interact with Database.	2
			10

Evaluation Scheme

1. **In Semester Assessment (ISA)**

Assessment	Marks

1.1.3 & 1.2.1 MCA courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year July 2021 to June 2022.

ISA- 1	20
ISA- 2	20
Activities	10
ISA	50
ESA	50
Total	100

2. **End Semester Assessment (ESA)**

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2, 3	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	4,5,6	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	7,8	Any 1 question is to be answered

Mini Project -1	20ECAP801

Course Code: **20ECAP801**	Course Title: **Mini Project-1**	
L-T-P: **0-0-3**	Credits: **3**	Contact Hrs: **6**
ISA Marks: 10**0**	ESA Marks: 10**0**	Total Marks: 2**00**
Teaching Hrs: **72 approx.**		Exam Duration: **3 Hours**

Students can use the following tools in web and mobile applications as well as product developments:

- Struts, Spring, Hibernate and JPA
- Machine Learning & Deep Learning
- JAXB and Apache Axis 2/Java
- JSP, Servlets, JDBC, EJB, JMS, JTA and JUnit
- Apache Tomcat, JBoss and GlassFish
- JavaScript, JSF, GWT and jQuery
- Eclipse, Netbeans and JBoss tools
- TestNG
- jBPM and Drools
- JCR

Objectives:
Help students to utilize and strengthen the knowledge of java which they have learnt in previous semester.

Methodology:

Students are asked to make a team of 3-4 members and can choose the different categories of projects like desktop applications, web applications, mobile application and distributed application and work once it is approved by the coordinator.

Assessment:
Students Assessment through CIE (80%) + SEE (20%)

Continuous Internal Evaluation	Assessment	Marks
	Problem Definition, Literature Review	10
	Synopsis and SRS Deliverables	10
	Design (Module wise algorithmic design)	20
	Coding	10

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	Integration and testing	10
	Report	10
	Presentation skills and Viva-voce	10
	Total	**80**
Semester End Examination	Presentation	10
	Viva-voce	10
	Total	100

1.1   Course Objectives:

The Mini Project being part of the course work is not only a mechanism to demonstrate the abilities and specialization but also provides the opportunity to demonstrate originality, teamwork, inspiration, planning and organization in a software project. One can put into practice the techniques that have been taught throughout the previous courses. Mini-projects develop practical skills in students. The idea is to propose a problem that one might encounter in future career (be it in academia, industry, or government). Then propose a solution and implement it.

E-commerce Objectives:

Most business houses are shifting their operations to the online world. Right from buying apparels to computers to booking tickets and renting out apartments, everything can be done through the Internet now. It is a win-win formula for both the customers and the business houses. Digital India aims to boost E-business and the E-commerce industry with the vision that it would in turn boost the economy is a whole.

Multilingual Objectives:

Language is an essential driver of enterprise growth. The user interface is the key component of any application that needs to support various language speaking audiences.   Making an app that appeals to and is available for more users broadens the market and brings more revenue in the app sales and there will be more exposure to the business.

Evaluation:

• The project assessment is done by an evaluation team as per the schedule.

Guidelines for In Semester Assessment (ISA) Scheme

Phase wise distribution of marks	Marks
Identification and defining the problem	15
Software Requirement Specification	20
Software Design	15
Mid–way Implementation	10
Final Demo and Report Submission	20
Total	80

End Semester Assessment (ESA):

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There will be a final presentation /demonstration//viva-voce at the end of the semester for 20 Marks

Machine Learning	20ECAE803

Course Code: **20ECAE803**	Course Title: **Machine Learning**	
L-T-P: **3-0-1**	Credits: **4**	Contact Hrs: **5**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: **40+24**		Exam Duration: **3Hrs**

No	Content	Hrs
	Unit I	
1	**Chapter 1 : Introduction to machine learning**	6 Hrs
	Introduction to Machine Learning, Applications of Machine Learning, Types of Machine Learning: Supervised, Unsupervised and Reinforcement learning, Dataset formats, Features and observations.	
2	**Chapter 2 : Supervised Learning: Linear Regression, Logistic Regression**	10 Hrs
	Linear Regression, Logistic Regression: Single and Multiple variables, Sum of squares error function, The Gradient descent algorithm: Application, The cost function, Classification using logistic regression, one-vs-all classification using logistic regression, Regularization.	
	Unit II	
3	**Chapter 3 : Supervised Learning: Neural Network**	8 Hrs
	Introduction to Neural Network, Model representation, Gradient checking, Back propagation algorithm, Multi-class classification, Support vector machines, Applications & Use-cases.	
4	**Chapter 4 : Unsupervised Learning: Clustering and Dimensionality Reduction**	8 Hrs
	Introduction to Clustering, K means Clustering Algorithm, Cost function, Application, Dimensionality reduction, PCA- Principal Component Analysis Applications, Clustering data and PCA.	
	Unit III	
5	**Chapter 5 : Introduction to Deep Learning**	8 Hrs
	What is deep learning? Difference between machine learning and deep learning, Convolution Neural Networks (CNN), Recurrent Neural Networks (RNN), When to use deep learning?	

Text Book:

1. Tom Mitchell., Machine Learning, Mc Graw Hill, McGraw-Hill Science, 3rd edition.
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007

References:
1. Hands-On Machine Learning with Scikit-Learn and Tensor Flow, Concepts, Tools, and Techniques to Build Intelligent Systems, Aurelian Gerona, Publisher: O'Reilly Media, July 2016.
2. Advanced Machine Learning with Python Paperback, 28 Jul 2016 by John Hearty.

Tools/Libraries:
- o Python
  - ▪ Numpy, Scipy
  - ▪ Tensor flow / Theano / Keras

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- Sklearn.

Activities

#	TOPICS	ACTIVITY	WEIGHTAGE
1	**Introduction to Machine Learning**	Importing the libraries, dataset. Missing data, encoding categorical data, independent variable & dependent variable. Splitting the dataset into train, validation & test sets. Feature scaling.	10
		QUIZ	
2	**Supervised Learning: Linear Regression**	Simple Linear Regression – Predict the salary of employees given their years of experience.	10
		QUIZ	
3	**Supervised Learning: Linear Regression**	Multiple Linear Regression – Predict the profit to be gained by the investors of companies depending upon the expenses done for R&D Spend, Administration & Marketing Spend.	10
		QUIZ	
4	**Supervised Learning: Logistic Regression**	Logistic Regression – For the given Social Network data of customers, classify them as likely to purchase an item or not likely to purchase an item by analysing their age and estimated salary.	10
		QUIZ	
5	**Supervised Learning: Neural Network**	Neural Networks (Supervised Learning) – Apply SVM algorithm analyse a given customer data to categorise them as Probable & Improbable customers for an online web store.	10
		QUIZ	
6	**Supervised Learning: Neural Network**	Neural Networks (Supervised Learning) – For a given Bank Customer dataset with various features like Age, Income, Geography, Credit Rating, Products Bought so on, apply SVM to classify the customers as Exited or Not-Exited from the bank. Illustrate Backpropagation algorithm to minimize the classifier error.	15
		QUIZ	
7	**Unsupervised Learning: Clustering**	Clustering (Unsupervised Learning) – Apply K-Means algorithm for clustering the mall customers depending on their age, gender, income & spending score.	15
		QUIZ	
8	**Unsupervised Learning:**	Dimensionality Reduction (Unsupervised Learning) – For a given Wine dataset illustrate PCA to get 2 or 3 Principal Components among the 14 given features.	05

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	Dimensionality Reduction	QUIZ		
9	**Introduction to Deep Learning**	CNN (Deep Learning) – Using CNN develop a classifier to classify flowers in a Flower Image dataset.	10	
		QUIZ		
10	**Introduction to Deep Learning – RNN.**	QUIZ	05	
		TOTAL	**100**	

Evaluation Scheme

1. In Semester Assessment (ISA)

Assessment	Marks
ISA- 1	15
ISA- 2	15
Activities	20
ISA	**50**
ESA	**50**
Total	**100**

2. End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	3, 4	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	5	Any 1 question is to be answered

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Full Stack Development MEAN	20ECAE807

Course Code: **20ECAE807**	Course Title: **Full Stack Development - MEAN**	
L-T-P: **3-0-1**	Credits: **4**	Contact Hrs: **5**
ISA Marks: **50**	ESA Marks: **50**	Total Marks: **100**
Teaching Hrs: 42		Exam Duration:**3 Hrs**

No	Content	Hrs
	Unit I	
1	**Chapter 1 : Introduction to MEAN** Three-tier web application development, The evolution of JavaScript, Introducing	05hrs

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MEAN, Installing MongoDB, Installing Node.js, Introducing NPM.

2	**Chapter 2 : Getting Started with Node.js**	05hrs

Introduction to Node.js, JavaScript closures, Node modules, Developing Node.js web applications.

3	**Chapter 3 : Building an Express Web Application**	06hrs

Introduction to Express, Installing Express, Creating your first Express application, The application, request, and response objects, External middleware, Implementing the MVC pattern, Configuring an Express application, Rendering views, Serving static files, Configuring sessions.

Unit II

4	**Chapter 4 : Introduction to MongoDB**	05hrs

Introduction to NoSQL, Introducing MongoDB, Key features of MongoDB, MongoDB shell, MongoDB databases, MongoDB collections, MongoDB CRUD operations .

5	**Chapter 5 : Introduction to Mongoose**	06hrs

Introducing Mongoose, Understanding Mongoose schemas, Extending your Mongoose schema, Defining custom model methods, Model validation, Using Mongoose middleware, Using Mongoose DBRef.

6	**Chapter 6 : Managing User Authentication Using Passport**	06hrs

Introducing Passport, Understanding Passport strategies, Understanding Passport OAuth strategies; Introduction to AngularJS:- Introducing AngularJS, Key concepts of AngularJS, Installing AngularJS, Structuring an AngularJS application, Bootstrapping your AngularJS application, AngularJS MVC entities

Unit – III

7	**Chapter 7: Creating a MEAN CRUD Module**	04hrs

Introducing CRUD modules, Setting up the Express components, Introducing the ngResource module, Implementing the AngularJS MVC module, Finalizing your module implementation

8	**Chapter 8: Testing MEAN Applications**	05hrs

Introducing JavaScript testing, Testing your Express application, Testing your AngularJS application; Adding Real-time Functionality Using Socket.io:- Introducing WebSockets, Building a Socket.io chat.

Text Book:

1. *Amos Q, Haviv, Mean Web Development, Packt Publishing 2014.*

References:

1. *Colin J. Ihrig, Full Stack Javascript Development with MEAN, Sitepoint*

1.1.3 & 1.2.1 MCA courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year July 2021 to June 2022.

Activities

Evaluation Scheme

1. In Semester Assessment (ISA)

Assessment	Marks
ISA- 1	15
ISA- 2	15
Activities	20
ISA	**50**
ESA	**50**
Total	**100**

2. End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2, 3	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	4,5	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	6,7	Any 1 question is to be answered

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#	TOPICS	ACTIVITY	WEIGHTAGE

1	**Introduction to MEAN**	1. Installation of MongoDB and Node.JS on Windows/Linux Platform.
		2. Execute Node.JS program for the following
		  a) Start of the Node.JS Server.
		  b) Ensure Request/Response of the web application for login form.
		3. Installation of NPM/Yarn package manager.
		4. Execute Node.JS program using node packages.
		5. Demonstration of "package.json" and its features.
			10

2	**Getting Started with Node.js**	1. Program to compare JavaScript functions and Clouse functions. 2. Program to implement JavaScript closure for user registration and login use cases. 3. Developing calculator web application using Node.JS and its modules.	10
3	**Building an Express Web Application**	1) Installation of ExpressJS package for the project. 2) Program to ensure ExpressJS server is up and running on the specified port. 3) Developing an ExpressJS application for currency conversion use case to understand Request/Response of the objects.	15

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		4) Implement the following for currency conversion use case:
		   a) Program to create a module.
		   b) Program the export the modules.
		   c) Program to import the modules.
		5) Demonstrate ExpressJS template features for rendering the content of the web application.
		6) Develop an media player application for static media content.	

4	**Introduction to MongoDB**	1) Creating MongoDB database using MongoDB CLI.
		2) Demonstrate the Robo-Mongo Tool features for MongoDB access.
		3) Execute the following MongoDB queries for College Database:
		   a) Creation of required collection for college database.
		   b) Insertion of records for the created collection.
		   c) Executing the basic queries with different filter criteria's.
		   d) Executing different aggregate queries.
		   e) Sharding and Replication of MongoDB instance.
		4) Demonstration of MongoDB cluster and its features.
			15

5	**Introduction to Mongoose**	1) Installation of Mongoose and its dependency packages. 2) Program to create MongoDB schema with different attributes using Mongoose. 3) Implementation of supported mongoose model field validations. 4) Implementation of custom model methods for mongoose schema. 5) Program for Foreign Key reference using mongoose DBRef functionality.	15
6	**Managing User Authentication Using Passport Creating a MEAN CRUD Module**	1) Installation of passport and its dependency packages. 2) Program to implement local and OAuth passport strategies. 3) Implementation of OAuth for google and facebook authentication. 4) Installation of AngularJS and its dependency packages. 5) Program for form validation using AngularJS. 6) Implement CRUD operations for few of the modules of E-Commerce web applications using AngularJS, ExpressJS and MongoDB.	20
7	**Testing MEAN Applications**	1) Installation of karma, mocha and jasmine its dependency packages. 2) Program to implement unit testing using karma and mochaTest. 3) Program to implement unit testing using karma and JasmineTest. 4) Demostrate unit testing reports using karma-html-reporter.	15

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		5) Visualize the code coverage analysis using karma. 6) Installing Socket.io and its dependency packages. 7) Building an Chat application using Socket.io	
		Total	**100**

Certification (RPA) — 20ECAP802

Course Code: **20ECAP802**	Course Title: **Certification (Robotics Process Automation)**	
L-T-P: **0-0-2**	Credits: **2**	Contact Hrs: **Full Time**
ISA Marks: **100**	ESA Marks: **--**	Total Marks: **100**
Teaching Hrs: **Full Time**		Exam Duration: **3 Hours**

The students shall undergo certification on Robotics Process Automation (RPA) during the II or III semester vacation by choosing Automation Anywhere or UiPath course or both. The evaluation for the course shall be done after successful completion of certification on any one or both by III semester. The student has to submit the report along with certificates. The performance of this course will be reflected in IV semester grade cards.

Capstone Project Work — 20ECAP803

Course Code: **20ECAP803**	Course Title: **Capstone Project Work**	
L-T-P: **0-0-12**	Credits: **12**	Contact Hrs: **Full Time**
ISA Marks: **100**	ESA Marks: **150**	Total Marks: **250**
Teaching Hrs: **Full Time**		Exam Duration: **3 Hours**

A student must carry out a project on any domain using cutting edge technologies and demonstrates the same at the end of the semester.

Evaluation:

Students Assessment through ISA (100 Marks) + ESA (150 Marks)

	Assessment	Weigh in M
In Semester Assessment (100 Marks)	Periodic reviews by Committee and Guide	10
End Semester Assessment (150 Marks)	Final Review	15

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	Total	**250**

* ISA Rubrics will be intimated in the 1ˢᵗ week of CoE.

Evaluation:

In Semester Assessment (ISA): 100 Marks

Phase wise distribution of marks	
Project Proposal, Synopsis Presentation	50
SRS and Design	50
Mid–Way Implementation	50
Final Demo and Report Submission	50
Total	**200 (Scaled down to 100)**

1. **Semester End Examination (SEE): 150 Marks (Dissertation 100+ Viva-Voce 50)**

Dissertation: 100 Marks		
Sl. No.	**Parameters to check**	**Marks**
1	Requirements document quality (Identification of all requirements /Use cases)	30
2	Detailed Design and Implementation (DFD, algorithm/flowchart, ER Diagram, Data structure)	60
3	Test Plan	10
	Total	**100**

Viva-Voce: 50 Marks Which includes Write-Up and Project Demonstration
Write-Up 50 Marks + Demonstration 50 Marks
Total 100 Marks (Scaled down to 50 Marks)

Write-Up 50 Marks		
Sl. No.	**Parameters to check**	**Marks**
1	Brief Problem definition (clarity)	10
2	Block diagram representation of the solution/Design (Architectural Design)	20
3	Applications	10
4	Limitations	10
	Total	**50**

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Demonstration 50 Marks

Sl. No.	Parameters to check	Marks
1	Implementation of the project as per the stated objectives.	15
2	User Interface quality.	5
3	Code quality (Coding standards, modularity, Documentation)	10
4	Testing.	5
5	Individual Contribution.	5
6	Rating of the project by (external examiner).	5
7	Explanation of the code and modification if necessary (external examiner).	5
Total		**50**

Phase Wise Activities

Activity	Purpose / Objective	Deliverables	Schedule
Awareness **(By Coordinator)**	o To instruct about the course expectations and assessment rubrics.	-	Before Semester Commences
Identification and defining the problem and Software Requirement Specification **(By Student)**	o To identify a problem which includes innovation element? o Identify at least 3 constraints of the solution. o To explore one alternate approaches to solution for the identified problem. o Identify functional requirements and Nonfunctional requirements(if exist) o Test plan for Acceptance testing. o effort estimation.	One page description of problem abstraction with at least five product features for the identified problem. Software requirement document	Demo 1

Software Design **(by Student)**	o prepare suitable design for the whole system(Architecture , Data flow diagram, Class diagram, activity diagram)	Software Design Document (SDD)	Demo 2
Mid–way Implementation **(By student)**	o 50-60% work should be completed incorporating programming standards(documentation, modular approach) o Module testing.	Partial Source code	Demo 3
Final Demo and Report Submission	o Completion of the project as per the Problem definition o Evaluation of Report by Faculty in Charge	Report Final demo	Final Demo

Deep Learning	20ECAE809

Course Code: **20ECAE809**	Course Title: **Deep Learning**	
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3**
ISA Marks: **100**	ESA Marks: **--**	Total Marks: **100**
Teaching Hrs: 4**0 + 24**		Exam Duration: **3Hrs**

No	**Content**	**Hrs**
	Unit I	
1	**Chapter 1 : Deep Learning Intuition** Introduction to deep learning, Neural Network Basics, Batch Normalization in Neural Networks.	3 Hrs
2	**Chapter 2 : Adversarial Examples and Generative Adversarial Networks** Attacking neural networks with Adversarial Examples and Generative Adversarial Networks, Shallow Neural Network, Key concepts on Deep Neural Networks, Building your Deep Neural Network: step by step, Deep Neural Network – Application. Explaining and Harnessing Adversarial Examples, Generative Adversarial Nets, Conditional GAN, Super-Resolution GAN, CycleGAN.	7 Hrs
3	**Chapter 3 : Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization** Practical aspects of deep learning, Optimization algorithms, Initialization, Regularization, Gradient Checking, Optimization, Hyperparameter tuning, Batch Normalization, Programming Frameworks.	6 Hrs
	Unit II	
4	**Chapter 4 : Convolutional Neural Networks** **A guide to convolution for deep learning,** The basics of ConvNets, Deep	8 Hrs

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convolutional models, **Visualizing and Understanding Convolutional Networks, Deep Inside Convolutional Networks: Visualizing Image Classification Models, Understanding Neural Networks Through Deep Visualization.**

- Convolutional Model: application
- Keras Tutorial
- Residual Networks.

5   Chapter 5 : Interpretability of Neural Networks   **8 Hrs**

Detection Algorithms, Special Applications: Face Recognition & Neural Style Transfer, Dropout: A Simple Way to Prevent Neural Networks from Overfitting, DenseNet: Densely Connected Convolutional Networks.

Unit III

6   Chapter 6 : Recurrent Neural Networks : Deep Reinforcement Learning   **8 Hrs**

Introduction to Recurrent Neural Network, Building a Recurrent Neural Network - Step by Step

- Character-level Language Modeling
- LSTM
- Natural Language Processing and Word Embeddings
- Sequence Models and Attention Mechanism
- Operations on Word Vectors - Debiasing
- Emojify!
- Neural Machine Translation with Attention
- Trigger Word Detection

References:

3. Deep Learning, By Ian Goodfellow, Yoshua Bengio and Aaron Courville.
4. Deep Learning Tutorial, By LISA Lab, University of Montreal.
5. Deep Learning: Methods and Applications, By Li Deng and Dong Yu.
6. First Contact with TensorFlow, get started with Deep Learning Programming, By Jordi Torres.
7. Neural Networks and Deep Learning, By Michael Nielsen.
8. Advanced Machine Learning with Python Paperback, 28 Jul 2016 by John Hearty.

Tools/Libraries:

- o Python
  - Numpy, Pandas, Scipy
  - Tensor flow / Theano / Keras
  - Sklearn.

Activities

#	TOPICS	ACTIVITY	WEIGHTAGE
1	**Deep Learning Intuition**	• Python Basics with Numpy (Optional) • Implementation of Logistic Regression with a neural network mindset.	10

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2	**Adversarial Examples and Generative Adversarial Networks**	• Building Shallow Neural Networks • Planar data classification with a hidden layer	20	
3	**Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization**	• Working with Optimization Algorithms – Initialization, Regularization, Gradient Checking, Optimization • Working with Hyperparameter tuning & Batch Normalization. • Bird recognition in the city of Peacetopia (case study) • Autonomous driving (case study) • Tensorflow Tutorial	25	
4	**Convolutional Neural Networks & Interpretability of Neural Networks**	• Building Convolutional Model: step by step • Keras Tutorial. • Working with Residual Networks • Working on Face Recognition & Neural Style Transfer • Car Detection with YOLO – Case Study	25	
5	**Recurrent Neural Networks : Deep Reinforcement Learning**	• Building a Recurrent Neural Network - Step by Step • Dinosaur Land -- Character-level Language Modeling • Jazz improvisation with LSTM • Operations on Word Vectors - Debiasing • Neural Machine Translation with Attention • Trigger Word Detection	20	
		TOTAL	**100**	

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Evaluation Scheme

1. **In Semester Assessment (ISA)**

Assessment	Marks
ISA- 1	15
ISA- 2	15
Activities	20
ISA	**50**
ESA	**50**

Total	100

2. End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	3, 4	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	5	Any 1 question is to be answered

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Blockchain Technologies	20ECAE810

Course Code:**20ECAE810**	Course Title: **Blockchain Technologies**	
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3**
ISA Marks: **100**	ESA Marks: **-**	Total Marks: 1**00**
Teaching Hrs: **40+24**		Exam Duration:**3Hrs**

No	Content	Hrs
	Unit I	
1	**Introduction** What blockchain is, What blockchain isn't, Blockchain definitions, How are blockchains different from databases? History of blockchain, Blockchain 2.0, The motivations behind blockchain, Characteristics of blockchain, Background of DLT, The different types of blockchain, Overview of blocks, Influence of Moore's law on blockchain technology.	5 hrs
2	**A Bit of Cryptography**. Cryptography in blockchain, Classical cryptography, Cryptographic primitives, Symmetric key cryptography, Asymmetric key cryptography, Elliptic-curve cryptography, Digital signatures, Cryptographic hashing.	5 hrs
3	**Cryptography in Blockchain** Hashing in blockchain, Linking blocks in a blockchain, Linking blocks using an SHA256 hashing algorithm, Block structure, Blockchain functionality, Creating a blockchain, Byzantine failure problem in blockchain, Digital signatures in blockchain, Creating an identity, Signatures in transaction, Asset ownership in blockchain, Transferring an asset, Transmitting the transaction, Claiming the asset, Blockchain wallets.	6 hrs
	Unit - 2	
4	**Networking in Blockchain**. Peer-to-peer (P2P) networking, Network discovery, Block synchronization, Building a simple blockchain in a P2P network, Validating a new block, Selecting the longest chain, Conflict resolution, Block exchange between peers, Initial block synchronization, Broadcasting scenarios, Application interfaces.	6 hrs
5	**Cryptocurrency.** Bitcoin basics, Getting started with Bitcoin Core, Keys and addresses, Transactions, Mining and consensus, Blockchain, Blockchain networks, Bitcoin hard forks and altcoins, A simple cryptocurrency application: Transactions, Wallet, Transaction management.	5 hrs
6	Diving into Blockchain - Proof of Existence**.** MultiChain blockchain platform, Setting up a blockchain environment, Getting started with MultiChain, Proof of Existence architecture, Building the Proof of	5 hrs

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Existence application, Executing and deploying the application.

Unit - 3

7 Diving into Blockchain - Proof of Ownership**.**   4 hrs
Digital assets and identity, Proof of ownership, Smart contracts, Choosing the smart contract platform, NEO blockchain: Building blocks of a NEO blockchain, NEO technology, NEO nodes, NEO network, NEO transactions, Ethereum blockchain: Ethereum nodes, Getting started, Creating a decentralized application.

8 Blockchain Security**.**   4 hrs
Transaction security model, Decentralized security model, Attacks on the blockchain, Threats of quantum computing.

Text Book:

1.   Foundations of Blockchain, O'REILLY publications, 2019

References:

Evaluation Scheme

In Semester Assessment (ISA)

Assessment	Marks
ISA- 1	10
ISA- 2	10
Activities	30
ISA	**50**
ESA	**50**
Total	**100**

End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2, 3,	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	4, 5, 6	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	7, 8	Any 1 question is to be answered

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Practices

1. Implementation of basic cryptographic algorithms such as AES, ECC, RSA, ECDSA, SHA256.
2. Implementation of cryptographic primitives such as hash functions and digital signatures.
3. Implementation of P2P blockchain application.
4. Implementation of Interface for the cryptocurrency application such as wallet application and explorer application.
5. Implement decentralized application development using MultiChain blockchain framework by considering real time use case.
6. Develop decentralized application using smart contract concept in NEO and Ethereum blockchain platforms by considering real time use case.

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7. Simulation of double spend attack on the Bitcoin unconfirmed transaction.

Mobile Application Development	20ECAE811

Course Code: **20ECAE811**	Course Title: **Mobile Application Development**	
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3**
ISA Marks: 100	ESA Marks: **-**	Total Marks: 1**00**
Teaching Hrs: **40+24**		Exam Duration:**3Hrs**

No	Content	Hrs
	Unit I	
1	**Mobility and Android** Introduction, Mobility Panorama, Mobile Platforms, App Development Approaches, Android Overview.	2 Hrs
2	**Getting Started with Android** Introduction, Setting up Development Environment, Saying Hello to Android, Traversing an Android App, Project Structure, Logical Components of an Android App, Android Tool Repository, Installing and Running App Devices.	2 Hrs
3	**Learning with an Application** Introduction, 3CheersCable App, Mobile App Development, Challenges, Tenets of a Winning App.	3 Hrs
4	**App User Interface** Introduction, Activity, UI Resources, UI Elements and Events, Interaction among Activities, Fragments, Action Bar and Applications.	5 Hrs
5	**App Functionality - Beyond UI** Introduction, Threads, AsyncTask, Service, Notifications, Intents and Intent Resolution, Broadcast Receivers, Telephony and SMS- Their Application.	4 Hrs
	Unit - 2	
6	**App Data - Persistence and Access** Introduction, Flat Files, Shared Preferences, Relational Data, Data Sharing Across Apps, Enterprise Data.	4 Hrs
7	**Graphics and Animation** Introduction, Android Graphics, Android Animation.	4 Hrs
8	**Multimedia** Introduction, Audio, Video and Images, Playback, Capture and Storage.	4 Hrs
9	**Location Services and Maps** Introduction, Google Play Services, Location Services, Maps	4 Hrs
	Unit - 3	
10	**Sensors** Introduction, Sensors in Android, Android Sensor Framework, Motion Sensors, Position Sensors, Environment Sensors	3 hrs
11	**Testing Android Apps** Introduction, Testing Android App Components, App Testing Landscape Overview Publishing Apps: Introduction, Groundwork, Configuring, Packaging, Distributing.	3 hrs
12	**Chapter No. 12. Publishing Apps** Introduction, Groundwork, Configuring, Packaging, Distributing.	2 hrs

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1.1.3 & 1.2.1 MCA courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year July 2021 to June 2022.

Text Book:

1. AnubhavPradhan, Anil V Deshpande, Composing Mobile Apps using Android, 2014, Wiley, 2014

References:

1. Barry Burd, Android Application Development All in one for Dummies.
2. Ian F Darwin, Android Cookbook.
3. Frank Ableson, RobiSen, Chris King, C. Enrique Ortiz, Android in Action, Manning Publications.

Evaluation Scheme

In Semester Assessment (ISA)

Assessment	Marks
ISA- 1	10
ISA- 2	10
Activities	30
ISA	**50**
ESA	**50**
Total	**100**

End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2, 3, 4, 5	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	6, 7, 8, 9	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	10, 11, 12	Any 1 question is to be answered

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Mobile Application Development Practice Exercises

SI NO Topics

1. Designing of Layouts using android UI resources.

2. Working on Intents with multiple Activities.

3. Working on Fragments and Action Bars related features.

4. Implementation of Threading concepts using Thread and Runnable Classes.

5. Working on the functionalities of Android services.

6. Working on Persistence storages.

7. Working on Graphics, Animation and multimedia features

8. Implementation of device built in Sensor functionalities.

9. Working on Location Services and Maps

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Cyber Security & Forensics	20ECAE812

Course Code: **20ECAE812**	Course Title: **Cyber Security & Forensics**	
L-T-P: **3-0-0**	Credits: **3**	Contact Hrs: **3**
ISA Marks: **100**	ESA Marks: **-**	Total Marks: **100**
Teaching Hrs: 4**0+24**		Exam Duration:**3Hrs**

No	Content	Hrs
	Unit I	
1	**Chapter 1: Introduction to Cybercrime, Cyber offences & Cybercrime**	**8 Hrs**
	Cybercrime definition and origins of the word, Cybercrime and information security, Classifications of cybercrime, A global Perspective on cybercrimes. Cyber-attack plans, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes, Botnets, Proliferation of Mobile and Wireless Devices, Credit Card Frauds in Mobile and Wireless Computing Era. Security challenges posed by mobile devices.	
2	**Chapter 2: Tools and Methods used in Cybercrime, Phishing and identity theft**	**8 Hrs**
	Proxy servers, Phishing, Password cracking, key loggers and spyware, Virus and worms, Trojan horses and backdoors, steganography, DoS and DDoS, SQL Injection, Buffer Overflow, Attack on wireless Networks, Phishing and Identity theft.	
	Unit II	
3	**Chapter 3: Cybercrimes and Cybersecurity: The Legal Perspectives, Organizational implications.**	**8 Hrs**
	Cybercrime and the legal landscape around world, Why do we need Cyberlaw: The Indian Context, The Indian IT Act, Digital Signature and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cost of cybercrime and IPR issues, Web threats for organization, cloud computing threats; security and privacy implications, social computing issues; Guidelines for internet usage and safe computing; incident handling	
4	**Chapter 4: Understanding computer Forensics, Forensics of Hand-held devices**	**8 Hrs**
	Historical background of forensics; Digital forensics science; need for computer forensics; cyber forensics and digital evidence; Analysis E-mail; Digital forensics life cycle; chain of custody concepts; network forensics; Forensics and social networking; challenges in computer forensics; Hand-held devices and digital forensics; Toolkits for Hand-held device forensics; Techno-legal challenges form hand-held devices; Guidelines8	
	Unit – III	
5	**Chapter 5: Social, Political, Ethical and Psychological Dimensions**	**4 Hrs**
	Intellectual property in the cyberspace; Ethical dimension of cybercrimes; Psychology, mindset and skills of hackers and other cyber criminals; Sociology of cybercriminals.	
6	**Chapter 6: Cybercrime: Illustrations, Examples and Case studies**	**4 Hrs**
	Introduction, Real-Life Examples, Case Studies: Illustrations of Financial Frauds in Cyber Domain, Digital Signature-Related Crime Scenarios, Digital forensics case illustrations Online Scams.	

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Text Book (List of books as mentioned in the approved syllabus)

1. Nina Godbole & Sunit Belapur, "Cyber Security", Wiley India, 2011 and Reprint 2018.

References
1. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006.
2. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005.

Activities

#	TOPICS	ACTIVITY	WEIGHTAGE
1	**Introduction to Cybercrime, Cyber offences & Cybercrime**	• Exercise on hash functions and applications. • Message Authentication code • Symmetric and asymmetric algorithms. • Digital Signatures • Quantum shape Cryptology, Crypto libraries for developers • Detecting and protecting against Bitnets https://www.akamai.com/us/en/resources/what-is-a-botnet.jsp https://cryptobook.nakov.com/cryptography-overview	10
2	**Tools and Methods used in Cybercrime, Phishing and identity theft**	• Implementation of phishing simulator and identify the real time phishing scenario • Ethical hacking using Kali Linux and penetration testing • Exploration and practice of Kali Linux Tools • **Aircrack-ng** : Aircrack-ng is a suite of tools used to assess WiFi network security. • **Nmap** : Network Mapper, also commonly known as Nmap, is a free and open source utility for network discovery and security auditing.	30

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			• **THC Hydra** : When you need to brute force crack a remote authentication service, Hydra is often the tool of choice. • **Nessus:** Nessus is a remote scanning tool that you can use to check computers for security vulnerabilities. • **WireShark**: WireShark is an open-source packet analyzer that you can use free of charge. • **Categories of SQL Injections** • Implementation of a steganography using various tools like: **Stegosuite, Stegohide, Xiao Steganography, SSuite Picsel, OpenPuff Camouflage** • https://stylesuxx.github.io/steganography/ • https://manytools.org/hacker-tools/steganography-encode-text-into-image/ • Identifying cross-site scripting vulnerabilities and prevention mechanisms • https://www.veracode.com/security		
3	**Cybercrimes and Cybersecurity: The Legal Perspectives, Organizational implications.**		• Guidelines on implications of organization from the view point of cybercrime and cybersecurity	10	
4	**Understanding computer Forensics, Forensics of Hand-held devices**		• **Parrot Security OS**: Parrot **Security** operating system is a Debian-based Linux distribution built by Frozenbox Network for cloud oriented penetration testing. It is a comprehensive,	20	

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		portable **security** lab that you can use for cloud pentesting, computer forensics, reverse engineering and hacking. • **WebGoat:** The WebGoat, is a deliberately insecure web application, which is aimed at helping developers learn about security vulnerabilities. • **Categories of SQL Injections** and test vulnerabilities commonly found in java based applications.	
5	**Social, Political, Ethical and Psychological Dimensions**	Real world case studies on various scenarios and detailed discussion on the cybercrimes, applicable law and legal liabilities and modus operandi covered by the criminals. Example; i. Orkut fake profile cases ii. Email account hacking iii. Credit Fraud iv. Online share trading fraud v. Source code Theft vi. Theft of confidential information vii. Software/Music Pyracy viii. Phishing ix. Cyber pornography x. Online sale of illegal articles https://www.slideshare.net/ishmecse13/case-study-on-cyber-crime	15
6	**Cybercrime: Illustrations, Examples and Case studies**	• Analyzing e-mail header for the following using tools like **WolframAlpha** or **Ipfingerprint** • Determine the sender's geographic Location • Information about sender's IP address	15
		Total	**100**

Evaluation Scheme

1. In Semester Assessment (ISA)

Assessment	Marks
ISA- 1	10
ISA- 2	10
Activities	30
ISA	**50**
ESA	**50**
Total	**100**

2. End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	3,4	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	5,6	Any 1 question is to be answered

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Virtual Reality Systems	20ECAE814

Course Code: **20ECAE814**	Course Title: **Virtual Reality Systems**	
L-T-P: **3-0-0**	Credits: 3	Contact Hrs: 3
ISA Marks: **100**	ESA Marks: **--**	Total Marks: **100**
Teaching Hrs: 40+24		Exam Duration:**3Hrs**

No	Content	Hrs
	Unit I	
1	**Chapter 1 : Virtual Reality and Virtual Environment and The Historical Development of VR** Introduction, Computer graphics, Real-time computer graphics, Flight Simulation, Virtually environments, Virtually here, What is required?, The benefit of virtual reality, Historical Development of VR: Introduction, Scientific landmarks.	4 Hrs
2	**Chapter 2: 3D Computer Graphics** Introduction, The virtual world space, Positioning the virtual observer, The perspective projection, Human vision, Stereo perspective projection, 3D clipping, Color theory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hiddeny-surface removal, Realism, Stereographic image	4 Hrs
3	**Chapter 3: Geometric Modelling and Geometric Transformations** Introduction, From 2D to 3D, 3D space curves, 3D boundary representation, Other Modelling Strategies, Frames of reference; Geometric Transformations: Introduction, Frames of reference, Modelling Transformations, Instances, Picking, Flying, Scaling the	4 Hrs

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VE, Collision Detection.

| 4 | **Chapter 4: A generic VR System** | **4 Hrs** |

Introduction, The virtual environment, The computer Environment, VR technology, Modes of Interaction, VR systems.

Unit II

| 5 | **Chapter 5 : Interacting with the Virtual World** | **8 Hrs** |

User Interface Metaphors-Key Interactions: Manipulation, Navigation, and Communication, Manipulating a Virtual World-Manipulation Methods, Properties of Manipulation, Selection, Manipulation Operations, Manipulation Summary, Navigating in a Virtual World-Wayfinding, Trave, Navigation Summary, Interacting with Others-Shared Experience Collaborative Interaction, Interacting with the VR System (Metacommands)

| 6 | **Chapter 6: The Virtual Reality Experience** | **8 Hrs** |

Immersion-Physical/Sensory Immersion, Mental Immersion The Role of Realism in Immersion Point of View Venue, Rules of the Virtual World: Physics- Types of Virtual World Physics, User Interaction with the World Physics, Simulation/Mathematical Model, Object Co-Interaction, World Persistence, Interference from the Physics of the Real World, Substance of the Virtual World - World Geography, Objects, Agents, User Interface Elements

Unit – III

| 7 | **Chapter 7: Experience Design. Applying VR to a Problem** | **4 Hrs** |

Will VR Meet Your Goals? - Is VR the Appropriate Medium?, Creating a VR Application - Adapting from Other Media, Adapting from an Existing VR Experience, Creating a New VR Experience, Designing a VR Experience- Design Deliberately, Design with the System in Mind, Design with the Venue in Mind, Design with the Audience in Mind, Consider Design Tradeoffs, Design the User Objective, Design the End of the Experience, Document, Deploy, and Evaluate the Experience, The Future of VR Design

| 8 | **Chapter 8: The Future of Virtual Reality** | **4 Hrs** |

The State of VR - Technology Trigger, Peak of Inflated Expectations, Trough of Disillusionment, Slope of Enlightenment, Plateau of Productivity, The Field of VR Research, Trends, Technology Futures - Display Technologies, Input Technologies, Software - Hardware Interface Software, Application Development Software, Application Futures

Text Book:

1. John Vince, Virtual Reality Systems , Pearson, 2002
2. William R. Sherman, Alan B. Craig, Understanding Virtual Reality, Inteface, Application and Design, MORGAN KAUFMANN PUBLISHERS, 2003

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1.1.3 & 1.2.1 MCA courses having focus on employability/ entrepreneurship/ skill development offered by the University during the year July 2021 to June 2022.

Activities

#	TOPICS	ACTIVITY	WEIGHTAGE
1	**Getting Started**	Demonstrate the following: • The Dashboard interface • Creating a new scene • The Sumerian editor interface	10
2	**Amazon Sumerian Basics: Create your first scene**	Learn and accomplish the following: • Create a room with primitive entities (Box) • Cover lighting basics • Import entities from the asset library • Place and move objects • Create interactive behaviors using the State Machine • Add basic animations	15
3	**State Machine Basics**	Build **behaviors**, using a collection of **States** that are connected by **Transitions**, as an entity transitions from one state to another.	15
4	**Events Basics**	Create a simple action to rotate a *Box* entity when we click a *Sphere*.	15
5	**Timeline Basics**	Animate a drone to fly around a large sphere using the **Timeline** and **Keyframes**. The **Timeline** enables you to create animations and movements for scene entities. You can also trigger them by actions you set in the **State Machine**.	15
6	**Importing third Party Assets**	Import asset bundles that consist of multiple files by dragging and dropping them onto the canvas. Using this capability, you can import .obj files, .mtl files, meshes, materials, and textures using a single drag and drop.	15
7	**Material Fundamentals using the Classic Shader**	Demonstrate the concepts of adding Textures and optimizing the Material component by working with sphere Primitives.	15
		Total	**100**

Evaluation Scheme

3. In Semester Assessment (ISA)

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Assessment	Marks
ISA- 1	10
ISA- 2	10
Activities	30
ISA	**50**
ESA	**50**
Total	**100**

4. End Semester Assessment (ESA)

UNIT	8 Questions to be set of 20 Marks Each	Chapter Nos.	Instructions
I	3 Questions to be set of 20 Marks Each	1, 2, 3,4	Any 2 questions are to be answered
II	3 Questions to be set of 20 Marks Each	5,6	Any 2 questions are to be answered
III	2 Questions to be set of 20 Marks Each	7,8	Any 1 question is to be answered

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