Program: Master of Computer Applications (MCA)				**Semester :** II	
Course Probability and Statistics				**Module Code** 703BS0C003	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks- 100)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite Nil

Course Objective

This course aims to instill in students a sound knowledge of probability theory and statistical techniques. It equips the students with intermediate to advanced level concepts and tools in probability and statistics that help them tackle relevant problems within engineering domain.
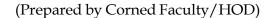
Course Outcomes

After completion of the course, students will be able to -
1. Solve problems involving random variables, probability distributions and testing of hypothesis, correlation and regression
2. Identify suitable probability distribution and testing techniques to solve related problems
3. Apply knowledge of random variables, probability distributions, measures of central tendency, correlation and regression to solve real life problems
4. Analyse data samples using statistical methods

Detailed Syllabus

Unit	Description	Duration
1	**Basic Probability** Probability spaces, conditional probability, independence; Bayes theorem.	03
2	**Random variables and Probability Distributions** Discrete random variables, probability mass function, cumulative distribution function, Independent random variables, Continuous random variables, distribution functions and densities, expectation, variance, raw and central moments of random variables, Binomial distribution, Poisson approximation to the binomial distribution, Normal distribution.	06
3	**Bivariate Distributions** Definition of Bivariate Distribution and their properties, Conditional densities.	02
4	**Basic Statistics** Measures of Central tendency; Moments, Moment generating function, skewness, kurtosis. Mean and variance of Binomial distribution & Poisson distribution, Moments, skewness & kurtosis for Normal distribution.	02
5	**Testing of hypothesis** Point estimation, Interval estimate and Confidence interval, Criteria for good	12

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	estimates, Null and Alternate hypothesis, Test Statistic, Type I and Type II errors, One-tailed and two-tailed test, Critical region, Large sample statistical test for mean, Large sample statistical test for proportion, t-test for small samples, Test for variance- F test, Chi-square test for Goodness of fit and independence of attributes, Analysis of variance.		
6	**Linear Statistical Models** Scatter diagram, Linear regression and correlation, Least squares method, Rank correlation, Multiple regression.	**05**	
	Total	30	

Text Books
1. Veerarajan T, *Probability, Statistics and Random Processes*, McGraw hill Education, 4th Edition, 2017.
2. S. Ross , *A First Course in Probability*, Pearson Education India, 9th Edition, 2013.

Reference Books
1. W. Feller, *An Introduction to Probability Theory and its Applications*, Vol. 1, John Wiley & Sons, 3rd Edition, 2017.
2. Devore, *Probability and Statistics for Engineering and Sciences*, Cengage Learning, 2nd Indian Edition, 2009.
3. Irwin Miller, John E. Freund and R. A. Johnson, *Probability & Statistics for Enginees*, Pearson Education India, 8th Edition, 2015.
4. S. C. Gupta, V. K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, 12th Edition, 2014.
5. Murray R. Spiegel, John J. Schiller, R. Alu Srinivasn, *Probability and Statistics*, McGraw Hill Education, 4th Edition, 2013.

Laboratory Work
8 to 10 experiments based on the syllabus.

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Program: Master of Computer Applications					Semester : II	
Course : Software Engineering					Code : 703IT0C001	
Teaching Scheme				Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks- 50)	Term End Examinations (TEE) (Marks- 100)	
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50	

Prerequisite: Programming for Problem Solving

Course Objective

The objective of the course is to familiarize the students with Software engineering principles, practices and standards required to develop a quality software. The course also intends to develop the ability and skills for the task of requirement analysis, design and modelling.

Course Outcomes

After completion of the course, the student will be able to -

1. Explain the characteristics of various process models used in the development of a Software project
2. Demonstrate an understanding of various Analysis and Design models that provide a basis for the software development
3. Apply UML concepts for modeling software functionality for a given scenario
4. Create test cases for validating the working of the software developed

Detailed Syllabus

Unit	Description	Duration
1.	**Importance of Software Engineering** Role of Software, Categories of Software, Legacy Software, Software Myth.	03
2.	**Prescriptive Process Models** Process Framework, Capability Maturity Model Integration, Waterfall Model, Incremental & RAD Models, Prototyping, Spiral Model, Concurrent Development Model. **Agile Process Models** Agility, Agile Process, Extreme Programming, Adaptive Software Development, SCRUM	07
3.	**UML Modeling** Visual modeling with UML, Use case model, Modeling with classes, Identifying classes and objects of real world problems, Defining events and attributes, process of creating class diagram.	08

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	State diagram, Activity diagram, Modeling interaction and behaviour, Sequence and Collaboration Diagram.	
4.	**Requirement Analysis & Design** Requirement Engineering tasks, Elements of Analysis Model, Data Modeling Concepts, Data Flow Model, and Control Flow Model.	**03**
5.	**Architectural Design** Software Architecture, Data Design, Architectural Styles, Representing System in Context, Refining Architecture into Components, Mapping Data Flow into a Software Architecture.	**03**
6.	**User Interface Design** Golden Rules for User Interface Design, Interface Analysis & Design, Interface Design Steps.	**02**
7.	**Testing Strategies & Software Quality** Test Strategies for Software, Verification & Validation Testing, Unit Testing, Integration Testing, System Testing. McCall's Software Quality Factors, ISO 9126 Quality Factors, Process & Project Metrics, Metrics for Software Quality, SQA Activities, CMMI.	**04**
	Total	**30**

Text Books

1. Pressman and Roger S., *Software engineering: a practitioner's approach*, 9th Edition, McGraw Hill, 2019.

Reference Books

1. Sommerville and Ian., *Software engineering*, 10th Edition, Pearson Education, 2017.

Laboratory Work

8 to 10 programming exercises (and a practicum) based on the syllabus.

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Program: Master of Computer Applications (MCA)					Semester: II	
Course: Data Analysis with Python					Code: 703CO0C020	
Teaching Scheme					Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit		Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks - 50)
2	4	0	4		Marks Scaled to 50	Marks Scaled to 50

Prerequisite : Nil

Course Objective

The course is designed to provide basic knowledge of Python programming and how to analyze and visualize data using Python programming.

Course Outcomes

After completion of the course, the student will be able to -

1. Understand the basic syntax and data structures.
2. Implement database connectivity in python
3. Identify appropriate data analysis and visualization technique for given scenario

Detailed Syllabus

Unit	Description	Duration
1	**Introduction to Python** Installation, Features, Python Interpreter and its working, Syntax and Semantics, comments, imports, indentation, variables, data types, math arithmetic, operators (comparison, logical, bitwise), expressions, print, formatting print, generating random numbers	03
2	**Python Data Structures & Flow Control** Strings, Lists, Dictionaries, Tuples, Sets; Slicing; properties, operations and methods of these data structures Conditional blocks using if, else and elif, Simple For loop, For loop using Ranges, While loops, Loop manipulation using Pass, Continue, Break List and dictionary comprehension.	04

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3	**Python Functions** Defining and calling functions, return, scope, function arguments (args and kwargs), recursive functions; Built-in functions: Lambda, Map, Filter, Reduce, Zip, Enumerate	03
4	**Database connectivity using Python** Database connectivity using SQLite3 and performing basic CRUD operations	04
5	**Data Analysis using numpy and pandas:** Introduction Numpy Array, Difference between list and Numpy Array, Operations on 1-D and 2-D Numpy Array, Introduction to Pandas and DataFrame, Understanding Data, Importing and Exporting Data, Preprocessing of Data, Data cleaning, Data normalization in python, Exploratory data Analysis, Groupby in Python	10
6	**Data Visualization:** Introduction to Data Visualization, Introduction to Matplotlib and line plot, **Basic Visualization tools**: Area Plot, Histogram and bar charts. **Advanced Visualization tools**: Waffle Charts, World Cloud, Seaborn and Regression Plot	06
	Total	**30**

Text Books:

1. Dr. R. Nageswara Rao, *Core Python Programming 3ed: Covers fundamentals to advanced topics like OOPS, Exceptions, Data structures, Files*, *Threads, Net,* 2nd Edition, Dream tech Pres, Wiley Publication, 2021.
2. Paul Barry, *Head first Python: A Brain Friendly guide*, 2nd Edition, O'Reilly publication, 2016.
3. Martin C. Brown, *Python: The Complete Reference*, 4th Edition, McGrawHill Education, 2018.

Reference Books:

1. Bill Lubanovic, *Introducing Python Modern computing in simple packages*, 3rd Edition, O'Reilly publication, 2019.
2. Wes McKinney, *Python for Data Analysis*, 2nd Edition, O'Reilly publication, 2017.
3. Jeeva Jose, P. Sojan Lal, *Introduction to Computing and Problem Solving with Python*, 1st Edition, Khanna Publication, 2019. Khanna Book Publishing ISBN-13 : 978-9382609810

Laboratory/ Tutorial Work

10 experiments / Programming exercises (and a practicum where applicable) based on the syllabus

Signature

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Program: Master of Computer Applications (MCA)					Semester: II	
Course: Advanced Database Management System (Department Elective – I)					Code: 703CO0E018	
Teaching Scheme				**Evaluation Scheme**		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks- 50)	Term End Examinations (TEE) (Marks -100)	
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50	

Pre-requisite: Database Management Systems

Course Objectives

This course involves study of advanced aspects of database systems like parallel and distributed Databases, webbase systems, object-oriented database systems. This also imparts knowledge on the design and implementation of database systems based on the client-server architecture and distributed database systems.

Course Outcomes

After successful completion of this course, students will be able to -
1. Describe concepts of advanced database systems
2. Explain database administration processes
3. Design and implement advanced relational databases
4. Implement parallel, distributed databases on the web for advanced applications

Detailed Syllabus:

Unit	Description	Duration
1	**The Extended Entity Relationship Model and Object Model** The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, subclasses, super classes, Inheritance, Specialization and Generalization, Constraints and characteristics of specialization and Generalization, Relationship types of degree higher than two.	05
2	**PL/SQL Programming** Introduction, Compare with SQL, PL/SQL block structure, conditional control, EXIT Statement, Iterative control, GOTO Statements, Exception Handling	06

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3	**Cursors, Procedures and Functions** Concept of a cursor, Types of cursors (Implicit, Explicit) cursor for loops, Procedure: Concept, creating procedures, IN-OUT variables, altering and dropping procedures, Functions: Concept, creating, altering and dropping functions, View: concept, types, creating, altering and dropping views, Trigger: Creating, altering and dropping Triggers	**06**
4	**Object-Oriented Databases** Overview of Object-Oriented concepts, object identity, object structure and type constructions, Database schema design for OODBMS, OQL, Systems comparison of RDBMS, OODBMS, ORDBMS.	**03**
5	**Parallel and Distributed Databases and Client-Server Architecture** Architectures for parallel database, Parallel query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; concurrency control and Recovery in distributed databases. An overview of Client-Server architecture.	**05**
6	**Information Retrieval & XML data** Overview of XML; XML Semi structure Model (Tree Model), XML DTD; XML Schema, Querying XML Data (XPath, XQuery)	**05**
	Total	**30**

Text Books:
1. Elmasri and Navathe, *Fundamentals of Database Systems*, 7th Edition, Pearson Education, 2016. ISBN:9789332582705, 2017
2. Evan Bayross, *SQL, PL/SQL the Programming Language of Oracle*, BPB, 2003. ISBN: 9788176569644 **SQL, PL/SQL - The Programming Language of Oracle – BPB Online** 2010

Reference Books:
1. Korth, Silberchatz, Sudarshan, *Database System Concepts*, 7th edition, McGraw-Hill, ISBN: 9789390727506, 2021.
2. R. Ramakrishnan, *Database Management Systems*, McGraw Hill, 3rd edition, 2003.
3. Ivan Bayross, *Oracle Developer* , BPB, 2000.

Laboratory / Tutorial work:

8 to 10 experiments / Tutorial exercises based on the syllabus.

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Program: Master of Computer Applications (MCA)				Semester : II	
Course : Advanced Java				Code : 703CO0E019	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks -50)	Term End Examinations (TEE) (Marks- 100)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite : Basic Java Programming

Course Objective

The objective of this course is to help students to develop web application using Servlets and JSP. Learning Hibernate and Spring frameworks will make students ready for the industry.

Course Outcomes

After completion of the course, student will be able to-

1. Design and Develop the Web based application
2. Develop Java application to interact with database
3. Develop applications using Java Frameworks

Detailed Syllabus:

Unit	Description	Duration
1.	**Servlet** Overview of Servlet Technology, Servlet life cycle, Downloading the Java Servlet Development Kit, the Servlet API, Handling HTTP GET Requests, Handling HTTP POST Requests, Cookies, Session Tracking.	05
2.	**JSP** Basics of JSP, Life cycle of JSP, JSP API, Scripting elements, Implicit Objects, Directive Elements, Action Elements.	05

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3.	**Hibernate Framework**	**06**
	Introduction, ORM, Hibernate Architecture, Hibernate Application, Persistent classes and mapping, , Hibernate CRUD, Inheritance and Collection Mapping, Hibernate Query Language (HQL), HCQL, Hibernate Caching.	
4.	**Spring Fundamentals**	**02**
	Introduction to Spring Framework, Spring Architecture, Inversion of Control (IoC) and Spring Core Container, Dependency Injection.	
5.	**Spring AOP**	**03**
	Introduction to Aspect Oriented Programming (AOP), Spring Advice API, working with Spring Pointcut and Advisors, Spring 2.0 AOP support.	
6.	**Spring JDBC and DAO Module**	**04**
	Data Access Object (DAO), DAO support in Spring Framework, Introduction Spring JDBC modules, JdbcTemplate and execute SQL queries, Implementing Hibernate with spring, Spring Boot JDBC.	
7.	**Spring Web MVC Framework**	**05**
	Introduction, Spring Web MVC Architecture, Understanding the Spring MVC Project Structure, Understanding DispatcherServlet and Request Processing workflow, Controllers and Validations, Describing View-Resolver and View, Configuring Spring Web MVC using Annotations.	
	Total	**30**

Text Books:

1. Santosh Kumar K, "*Spring and Hibernate*", 2nd Edition, McGraw Hill Education, 2017.
2. Joel Murach, Michael Urban, "*Murach's Java Servlets and JSP,*" 3rd Edition, Shroff/Mike Murach Associates, 2016

Reference Books:

1. Luliana Cosmina, Rob Harrop, Chris Schaefer, Clarence Ho, "Pro Spring 5: An In-Depth Guide to the Spring Framework and Its Tools", Apress., 2017

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2. Kogent Learning Solutions Inc. "Java Server Programming Java EE 7, Black book", Dreamtech Press, 2014. ISBN 9789351194170

Laboratory / Tutorial work:

8 to 10 experiments /Tutorial exercises based on the syllabus.

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Program: Master of Computer Applications (MCA)	Semester: II
Course: Internet of Things (Department Elective – I)	Code: 703CO0E010

Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks- 100)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite- Computer Networks, Basic Programming Skills, Basic Electronics

Course Objective: Students will gain advanced knowledge of key theories and concepts of the Internet of Things. They will acquire specialized problem-solving skills, being able to analyse and design new solutions based on Internet of Things technology.

Course Outcomes- After completion of the course, student will be able to:
1. Understand introduction to IoT architecture and M2M technology,
2. Understand IoT protocols,
3. Identify and analyse the various cloud components for IoT,
4. Understand the security issues in IOT

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to IoT:** IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals	**04**
2	**IoT Fundamentals:** IoT reference Model - IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views, Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.	**06**
3	**IoT protocols:** Networking Architectures: Star, Mesh, Tree, Networking Protocols: TCP/IP, 6LowPan, RPL, Thread, IoT Devices Application-Level Protocols: MQTT, CoAP, REST.	**05**

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4	**IoT and Cloud:** IoT Devices and Cloud access, Cloud components, Device to Gateway –Short Range Wireless (Cell Phone as Gateway, Dedicated Wireless Access Point), Gateway to Cloud- Long Range connectivity (Wired, Cellular, Satellite, WAN), Direct Device to Cloud connectivity, IoT Device Power Constraints, Powered and Unpowered Sensors, Power Harvesting, Energy Storage Technologies	**06**
5	**IoT Security:** Security Requirements in IoT Architecture - Security in Enabling Technologies - Security Concerns in IoT Applications. Security Architecture in the Internet of Things - Security Requirements in IoT - Insufficient Authentication/Authorization - Insecure Access Control - Attacks Specific to IoT, Encryption standards-AES, DES, RSA, Hashing, Authentication	**06**
6	**Case study:** Smart Cities, Smart Home Industrial Control, Smart Social Networks, Big Data Analytics	**03**
	Total	**30**

Text Books:
1. Vijay Madisetti and Arshdeep Bahga, ―Internet of Things (A Hands-on-Approach), 1 st Edition, VPT, 2014
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, ―From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014

Reference Books:
1. Peter Waher, ―Learning Internet of Things, 1st Edition, PACKT publishing
2. Bernd Scholz-Reiter, Florian Michahelles,, " Architecting the Internet of Things" , ISBN 978-3-642- 19156-5 e-ISBN 978-3-642-19157-2, 1st Edition, Springer, 2011
3. Brian Russel, Drew Van Duren, Practical Internet of Things Security (Kindle Edition), 1st Edition, Packt publishing,2016
4. Francis da Costa, Rethinking the Internet of Things: A scalable Approach to Connecting Everything, 1st Edition, Apress Publications , 2013

Laboratory / Tutorial work:

8 to 10 experiments /Tutorial exercises based on the syllabus.

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Program: Master of Computer Applications (MCA)				Semester: II	
Course: Human Computer Interaction (Department Elective-I)				Code : 703CO0E003	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks- 50)	Term End Examinations (TEE) (Marks- 100)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Software Engineering

Course Objective

This course gives an introduction to Human Computer Interface and provides an understanding of user centered design process. It will help students to design and evaluate interactive systems keeping users in mind.

Course Outcomes

After completion of the course, student will be able to -

1. Discuss the importance of good interface design for human computer interaction
2. Apply design principles, models and evaluation techniques to user interface design
3. Identify various aspects of user experience and design thinking in HCI
4. Design user interface application using HCI concept

Detailed Syllabus

Unit	Description	Duration
1	**Introduction** Introduction to HCI, Importance of good interface design, Notions-Human, Computer & Interaction. Multi-disciplinary Applications of HCI.	04
2	**Design Process & Interaction** Introduction of design, Types of design: User-centered design, Participatory design, Scenario based design, Interaction design basics, users & persona, scenario	05
3	**Design Rules** Cognitive psychology – Visual perception, Ergonomics, Memory Models, Shneiderman's design rules, Norman's 7 principles for designing	06
4	**HCI Models** GOMS model, Hierarchical Task Analysis	03
5	**Evaluation Techniques in HCI** Need of evaluation in interface designing, introduction to quantitative and qualitative research methods in designing, Types of evaluation techniques-Heuristics evaluation model, Experimental evaluation model.	06

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6	**User Experience** Basic understanding of UX in HCI, Role of UI and UX in HCI designing, Elements of UX	04
7	**Designing for Emerging Technologies** Voice based UI, designing for wearables.	02
	Total	30

Text Books
1. Helen Sharp, Jennifer Preece, Yvonne Rogers *Interaction Design: Beyond Human-Computer Interaction*, 5th Edition, Wiley Publication, 2019.
2. Alan Dix, Janet Finlay, Gregory Abowd, Russel Beale, *Human–Computer Interaction*, 4th Edition, Pearson Education, 2009.

Reference Books
1. Ben Shneiderman, *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, 3rd Edition, Pearson Education, 2014.
2. Follett Jonathan (Ed), *Designing for Emerging Technologies*, 1st Edition, O'Reilly, 2014.
3. Levy Jaime, *UX Strategy: How to Devise Innovative Digital Products that People Want*, 1st Edition, O'Reilly, 2015.

Laboratory Work:
8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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Program: Master of Computer Applications (MCA)					**Semester:** II	
Course: Advanced Web Technologies					**Code** :	
Teaching Scheme				**Evaluation Scheme**		
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks- 50)**		**Term End Examinations (TEE) (Marks-50)**
2	4	0	4	Marks Scaled to 50		Marks Scaled to 50

Prerequisite: Web Technologies

Course Objective

This course is designed to enhance and enrich skills in Web programming. Students will learn to develop Web applications using advanced technologies like React JS, AJAX, Node JS and database programming with Mysql and MongoDB.

Course Outcomes

After completion of the course, student will be able to -

1. Construct front end GUI using client-side scripting
2. Develop web applications using server-side scripting
3. Design backend database for web application

Detailed Syllabus

Unit	Description	Duration
1	**React JS**: Introduction, Render HTML, Components – Class and Function, Props, Events, Forms, Hooks, React Router	**10**
2	**JSON** Introduction, Syntax, JSON vs XML, Data Types, Parse, Stringify, objects, Arrays, JSON HTML.	**03**
3	**AJAX (Asynchronous JavaScript and XML)** Introduction, Use of Ajax in Web Applications, XML, Http Request and Response, Ajax XML file.	**03**
4	**Node JS** Introduction, Modules, HTTP module, URL module, File system, NPM, Events and Event Emitter, Exception handling.	**05**
5	**MYSQL database with Node.js** Introduction, Express.js, create database, create table, insert, update select, delete, where, order by, drop table.	**04**

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6	**MongoDB**	**05**
	Introduction to NoSQL databases, MongoDB Overview, data types, data modeling, CRUD Operations in MongoDB, Indexing and Aggregation, MongoDB with Node JS.	
	Total	**30**

Text Books

1. Stoyan Stefanov, "*React – Up & Running: Building Web Applications*", 2nd Edition, O'Reilly Media, Inc., 2021. ISBN:9789355420695
2. Colin J Ihrig , Adam Bretz, "*Full Stack JavaScript Development With MEAN: MongoDB, Express, AngularJS, and Node.JS*", Sitepoint Publishers, 1st Edition, 2015. ISBN:9789352131594

Reference Books

1. David Stokes, "*MySQL and JSON: A Practical Programming Guide*", 1st Edition, Mc Graw Hill, 2017
2. Greg Lim, "*Beginning Node JS, Express and Mongo Development*", 1st Edition, 2019
3. DT Editorial Services, "*HTML5 Black book, covers CSS 3, Javascript, XML, XHTML, AJAX, PHP and JQuery*", 2nd edition, Dreamtech Press, 2016.

Laboratory / Tutorial Work:

8 to 10 experiments / Tutorial exercises based on the syllabus.

Signature

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Program: Master of Computer Applications (MCA)				Semester: II	
Course: Artificial Intelligence				Module Code: 703CO0C008	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks- 50)	Term End Examinations (TEE) (Marks- 100)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Data Structure and Algorithms, Programming for Problem Solving.

Course Objective

To impart knowledge of the fundamental theories, methods and techniques in the field of Artificial Intelligence and to design and develop AI systems.

Course Outcomes

After completion of the course, students will be able to

1. Explain agents and environment in AI
2. Apply various heuristic and searching strategies to solve problems in the AI domain
3. Design knowledge base using expert systems and game playing
4. Implement supervised and unsupervised learning approaches to solve problems in the AI domain

Detailed Syllabus

Unit	Description	Duration
1	**Introduction to Artificial Intelligence** Definitions of AI, Applications of Artificial Intelligence, Concept of Modeling, Inference and Learning. Introduction to Machine learning and Deep learning as a subset of AI. Intelligent agents, concept of rationality, structure of agents, Environment, Properties of task environment. Real world Examples of agents and environments.	04
2	**Solving problems by Searching** Problem solving agents, searching for solutions. Uninformed Search: Breadth first search, Depth first search, Uniform cost search Informed Search: Informed search strategies, Greedy Best First Search, A* search, Hill climbing, problems with hill climbing such as Local Maxima, Plateau, Ridge, Genetic Algorithm. Adversarial Search: Introduction to the Domain of a game, optimal decisions in games, minimax algorithm, Alpha-beta pruning.	07

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3	**Knowledge Representation** Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution.	**06**
4	**Constraint satisfaction Problem (CSP)** Constraint satisfaction problems, Backtracking search for CSPs, variables and value ordering, propagating information through constraints, Intelligent backtracking, Local search for CSP. Case study on CSP.	**05**
5	**Learning** Inductive learning, Types of learning, supervised - decision trees classification, unsupervised learning – K-means clustering.	**05**
6	**Expert system** Definition, model, characteristics, architecture, development process, limitations, examples of expert systems.	**03**
	Total	**30**

Text Books

1. Stuart Russel and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 4th edition, 2022, Pearson.
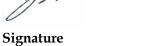2. Dan W. Patterson, *Introduction to Artificial Intelligence and Expert System*, Pearson, 1st edition, 2015.

Reference Books

1. Elaine Rich, Kevin Knight, *Artificial Intelligence*, 3rd edition, Tata Mc-Graw Hill, 2015.
2. Patrick H. Winston, *Artificial Intelligence*, 3rd edition, Pearson, 2002.

Laboratory Work

8 to 10 experiments (and a practicum where applicable) based on the syllabus.

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Program: Master of Computer Applications (MCA)				Semester: II	
Course: Mobile Application Development				Code: 703AI0C001	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 100)**	**Term End Examinations (TEE)**
2	2	0	3	Marks Scaled to 100	-

Prerequisite: Knowledge of Programming

Course Objective

The objective of this course is to gain insights into the Android and IOS Operating systems and to understand the components and layouts of these applications. It will also help the students to implement database connectivity with real-time databases and further develop an Android/IOS based application.

Course Outcomes

After completion of the course, students will be able to -
1. Design user interfaces using Android Studio and Flutter
2. Implement file handling using text and images
3. Implement database connectivity and location tracking
4. Develop a full-fledged Android/IOS application

Detailed Syllabus

Unit	Description	Duration
1.	**Configuration of Development Platform** Starting an Android Application project/IOS Application Project: Installing the Application Development Kit (Android Studio / IOS)	**02**
2.	**Understanding the different Components for Application Design** Screen Layout, Simple Controls, Creating and Configuring an Android Emulator, Communicating with the Emulator. Controls and the User Interface: Check Boxes, Radio Buttons, Spinner, Date Picker, Touch Listener, Graphics. Multiscreen Applications: Stretching the Screen, Pop-up Dialog Boxes and Toasts, Menus.	**10**
3.	**Inputting Images and File Handling** Displaying Images, Using Images stored on the Android Device, File handling using .txt and .csv files	**04**
4.	**Location Tracking** Location Tracking using Google maps	**02**
5.	**Introduction to Flutter** Understanding the configuration and UI development using Flutter	**04**
6.	**Processing using Databases** Database connectivity using SQLite 3 and Firebase	**05**
7.	**Application Publishing** Client-Server Applications and Publishing your application	**03**
	Total	**30**

Signature

(Head of the Department)

Text Books
1. John Horton, *Android Application Development for Java Programmers*, 3rd Edition, Packt Publishing, 2021.
2. Barry Burd, *Flutter for Dummies*, 1st Edition, 2020.
Reference Books
1. Barry Burd , *Android Application Development All in one for Dummies*, 3rd Edition, July 2020.
2. Rick Boyer, *Android 9 Development Cookbook*, 3rd Edition, Packt Publishing, 2018.
3. Alessandro Biessek, *Flutter for Beginners*, 1st Edition, Packt Publishing, 2019.
Laboratory Work
8 to 10 experiments (and a practicum where applicable) based on the syllabus

Signature

(Head of the Department)

Program: Master of Computer Applications (MCA)					Semester: II	
Course: Technical Communication					Code: 703BS0C004	
Teaching Scheme					Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)		Term End Examinations (TEE)
-	-	1	1	Marks scaled to 50		-
Pre-requisite: Fundamentals of English Communication						

Course Objective

The objective of the course is to develop students' proficiency in written technical communication so that they are able to produce documents of the kind required in the workplace, such as reports and letters, thatare sound, effective, coherent and error-free

Course Outcomes

After completion of the course, the student will be able to –

1. Apply the fundamentals of written communication to create written documents that are coherent,error-free and well organized
2. Develop the ability to create effective and persuasive business correspondence, such as letters andemails, that follow etiquette and are able to achieve the desired outcomes
3. Create basic reports such as memo, letter and survey-based report, using their understanding of report writing

Detailed Syllabus

Unit	Description	Duration
1.	**Principles of Effective Writing** Salient features of sentence construction, Paragraph writing, 7 Cs ofcommunication, Making outlines, Writing for the Web	**02**
2.	**Writing Skills** Note taking, Summarizing Fiction / Non-fiction	**04**
3.	**Business Correspondence** Business letter writing – principles and types, Business email writing – subject line,recipient design, language, structuring content, framing, etiquette, cultural sensitivity	**04**
4.	**Report Writing** Introduction – what is a report, types, and characteristics of reports, pre-writing, principles and of report writing, Ethics in Writing - plagiarism. Survey-based reports Memo Report Letter Report Academic Report (with References and Citations)	**05**
	Total	**15**

Text Books

1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, 3rd ed. Oxford University Press, 2015

Reference Books

1. Shirley Mathew, *Communication Skills*, Technical Publications, 2013
2. Sheryl Lindsell-Roberts, *Technical Writing for Dummies*, Hungry Minds Inc., 2001
3. Mike Markel, *Technical Communication*, Palgrave Macmillan, 2012

(Prepared by Corned Faculty/HOD)

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