

SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering

Program: Master of Computer Application (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, student 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.	3
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.	6
3	Bivariate Distributions Definition of Bivariate Distribution and their properties, Conditional densities.	2
4	Basic Statistics Measures of Central tendency; Moments, Moment generating function,	2



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	skewness, kurtosis. Mean and variance of Binomial distribution & Poisson distribution, Moments, skewness & kurtosis for Normal distribution.	
5	Testing of hypothesis: Point estimation, Interval estimate and Confidence interval, Criteria for good 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.	12
6	Linear Statistical Models: Scatter diagram, Linear regression and correlation, Least squares method, Rank correlation, Multiple regression.	5
	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 Engineers", 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 Application (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) (Marks- 100)
-	-	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, that are sound, effective, coherent and error-free					
Course Outcomes After completion of the course, the student will be able to - <ol style="list-style-type: none"> 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 and emails, 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 of communication, 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 -				04



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	subject line, recipient design, language, structuring content, framing, etiquette, cultural sensitivity	
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



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Program: Master of Computer Application (MCA)				Semester : II	
Course : Advanced Web Technologies				Code : 703CO0C019	
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
* Practical Examination conducted at school level					
Pre-requisite: 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 Angular JS, AJAX, Node JS and database programming with Mysql and MongoDB.					
Course Outcomes After completion of the course, student will be able to - <ol style="list-style-type: none"> 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	Angular JS Introduction to Angular JS, Single Page Application, Angular features, Expressions, Modules, Directives, Model, controllers, Data bindings, Scopes, Tables, Angular JS Forms and validation, Services, HTTP, Dependency Injection.				06
2	JSON Introduction, Syntax, JSON vs XML, Data Types, Parse, Stringify, objects, Arrays, JSON HTML, JSON PHP, JSONP.				04
3	AJAX (Asynchronous JavaScript and XML)				05

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	Introduction, Use of Ajax in Web Applications, XML, Http Request and Response, Ajax XML file, Ajax implementation using PHP as server side scripting language.	
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
6	MongoDB Introduction to NoSQL databases, MongoDB Overview, data types, data modeling, CRUD Operations in MongoDB, Indexing and Aggregation, MongoDB with Node JS.	06
	Total	30

Text Books

1. Amos Q. Haviv, Adrian Mejia, Robert Onodi, "Web Application Development with MEAN", Packt Publishing, Illustrated Edition, 2017
2. Colin J Ihrig , Adam Bretz, "Full Stack JavaScript Development With MEAN: MongoDB, Express, AngularJS, and Node.JS", Sitepoint Publishers, 1st Edition, 2015

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.

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Program: Master of Computer Application (MCA)				Semester: II	
Course: Industrial Economics and Management				Code: 703TG0C001	
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)
3	0	0	3	Marks Scaled to 50	Marks Scaled to 50
Pre-requisite: Nil					
Course Objective: The objective of the course is to give the basic understanding of the principles of management and give an insight into Finance & Marketing. To understand broader aspects of the economy and its environment. To combine elements of basic micro and macroeconomics. The faculty is expected to give the domain knowledge of different types of organizations.					
Course Outcomes: After successful completion of this course, student will be able to <ol style="list-style-type: none"> 1. Explain basic concepts of industrial economics. 2. Describe theories of management. 3. Apply the concepts of management for understanding organizational functions. 					
Detailed Syllabus:					
Unit	Description				Duration
1	Introduction: Industrial Economics, Problem of scarcity of economic resources, the economic systems.				03
2	Demand, Production, Cost & Supply Analysis: Concept of demand, Determinants of Demand, Demand Function and elasticity of demand and their managerial uses - Production Function, Cost Concepts, Cost Function, Estimation of Cost Function - Concept of Supply and Supply function.				10

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	Structure of Market / Industry Analysis: Types of Competition – monopoly, oligopoly, monopolistic competition, perfect and imperfect competition	
3	Macro Economics Indicators: GDP, Inflation & Employment, Government & Central Banking – Function of central banking, monetary policy and fiscal policy, taxation, balance of trade and payments. New Economic Policy: Liberalization, privatization, globalization.	10
4	Introduction to Management : Development of management thought, contribution of F.W. Taylor, Henri Fayol, Elton – Mayo, Nature of Planning, decision making process, Managing by Objectives (MBO)	05
5	Organizational Structure: Line and staff relationships, centralization & decentralization, role of delegation of authority.	04
6	Theory of Motivation: Maslow, Herzberg & McGregor theory of motivation, McClelland's achievement theories	04
7	Introduction to Production & Marketing Management: Production, planning and control, inventory control, quality control, sales, advertising, marketing research	05
8	Introduction to Finance & Human Resource Functions: break-even analysis, budgeting, staffing.	04
	Total	45

Text Books:

1. Ruddar Datt, K.P.M. Sundharam, "Indian Economy", S. Chand & Company Ltd, 2006
2. L.M.Prasad, "Principles and Practice of Management", Sultan Chand & Sons, 7th edition, 2008

Reference Books:

1. Paul A. Samuelson and William D. Nordhaus, "Economics", McGraw Hill, 1th Edition, 2006
2. Harold Koontz and Cyril O'Donnel Heinz Weihrich, "Essentials of Management", McGraw-Hill, 2007
3. V S Ramaswamy & S Namakumari, "Marketing Management Planning, Implementation and control, Global Perspective Indian Context", Macmillan India Limited, New Delhi, 3rd Edition, 2005.



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4. Yogesh Maheshwari, "Managerial Economics", PHILPL 2011.
5. Khan & Jain, "Financial Management", Tata McGraw-Hill Education, 2007.
6. Dr. B. S. Goel, "Production Operations Management", Pragati Prakashan, 8th edition, 2005.



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Program: Masters of Computer Application (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
* Practical Examination conducted at school level					
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 - <ol style="list-style-type: none"> 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				04

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	List and dictionary comprehension.	
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*, 2nd Edition, Dreamtech Pres, Wiley Publication, 2018.
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.

Laboratory/ Tutorial Work

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

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Program: Master of Computer Application (MCA)				Semester : II	
Course : Professional Ethics for IT				Code : 703IT0C002	
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)
1	0	0	1	Marks Scaled to 50	---
Pre-requisite: Nil					
Course Objective: <p>This course gives an introduction to Ethics in Information Technology. It covers ethics related to IT users and ethics applicable in an IT organization's context.</p>					
Course Outcomes <p>After completion of the course, student will be able to -</p> <ol style="list-style-type: none"> 1. Describe various approaches to ethical decision making, 2. Explain ethical issues that arise at workplace, 3. Identify copyrights, patents and laws needed in IT organizations. 					
Detailed Syllabus:					
Unit	Description				Duration
1	An Overview of Ethics <p>Brief introduction to ethical theories -Consequence based, duty based. Definition of ethics, the importance of integrity, the difference between morals, ethics and laws, ethics in the business world: forecasting business ethics, improving corporate ethics, creating an ethical work environment, decision making, ethics in information technology.</p>				03
2	Ethics for IT workers and IT Users				03

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	IT professionals: Professional business industry, managing professional relationship, professional code of ethics, professional organizations, certification, government licensing, IT professional malpractice. IT Users: common ethical issues, ethical practice of IT users.	
3	Intellectual Property Intellectual property, copyrights, patents, trade secrets and its laws, employees and trade secret, key intellectual property issues, plagiarism, reverse engineering, open source code, competitive intelligence, trademark infringement, cyber-squatting.	03
4.	Ethics of IT Organization Key ethical issues for organizations, ethics in IT outsourcing, whistle blowing, green computing, ICT industry code of conduct.	03
5.	Ethical aspect of Online communities, Emerging and Converging Technologies Ethical concerns in online communities, Ubiquitous computing, Intelligent user interfaces and other emerging technologies.	03
	Total	15

Text Books:

1. R. Subramanian, *Professional Ethics includes human values*, Oxford, 2nd Edition, 2017.
2. Herman T. Tavani, *Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing*, John Wiley & Sons, 5th Edition, 2016.

Reference Books:

1. George Reynolds, *Ethics in Information Technology*, Cengage India, 5th Edition, 2015.
2. Gold Tandy, *Ethics in IT outsourcing*, Taylor & Francis Ltd, 2012.
3. Robert A. Schultz, *Contemporary Issues in Ethics and Information Technology*, Idea Group Inc (IGI), 2006.

Laboratory / Tutorial work:

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

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Program: Master of Computer Application (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 - <ol style="list-style-type: none"> 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
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				06

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	dropping procedures, Functions: Concept, creating, altering and dropping functions, View: concept, types, creating, altering and dropping views, Trigger: Creating, altering and dropping Triggers	
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.
2. Evan Bayross, *SQL, PL/SQL the Programming Language of Oracle*, BPB, 2003.

Reference Books:

1. Korth, Silberchatz, Sudarshan, *Database System Concepts*, 6th edition, McGraw-Hill, 2011.
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 Application (MCA)				Semester : II	
Course : Advanced Java (Department Elective I)				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 <p>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.</p>					
Course Outcomes <p>After completion of the course, student will be able to-</p> <ol style="list-style-type: none"> 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 <p>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.</p>				05
2.	JSP <p>Basics of JSP, Life cycle of JSP, JSP API, Scripting elements, Implicit Objects, Directive Elements, Action Elements.</p>				05

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3.	Hibernate Framework Introduction, ORM, Hibernate Architecture, Hibernate Application, Persistent classes and mapping, , Hibernate CRUD, Inheritance and Collection Mapping, Hibernate Query Language (HQL), HCQL, Hibernate Caching.	06
4.	Spring Fundamentals Introduction to Spring Framework, Spring Architecture, Inversion of Control (IoC) and Spring Core Container, Dependency Injection.	02
5.	Spring AOP Introduction to Aspect Oriented Programming (AOP), Spring Advice API, working with Spring Pointcut and Advisors, Spring 2.0 AOP support.	03
6.	Spring JDBC and DAO Module 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.	04
7.	Spring Web MVC Framework 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.	05
	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.

Laboratory / Tutorial work:

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

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Program: Master of Computer Application (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: <ol style="list-style-type: none"> 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 Madiseti and Arshdeep Bahga,—Internet of Things (A Hands-on-Approach), 1st 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 Application (MCA)				Semester: II	
Course: Human Computer Interaction				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 - <ol style="list-style-type: none"> 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.

Seema Shah



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Program: Master of Computer Application (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 - 50)	Term End Examinations (TEE) (Marks - 100)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50
* Practical Examination conducted at school level					
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, the student will be able to - <ol style="list-style-type: none"> 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

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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

Text Books

1. James C. Sheusi, *Android Application Development for Java Programmers*, 1st edition, Delmar Cengage Learning, 2012
2. Reto Meier, *Professional Android 2 Application Development*, 1st edition, Wiley India Pvt Ltd. 2010

Reference Books

1. Jonathan Simon, *Head First Android Development*, 1st edition, O'Reilly Media, 2012.
2. Barry Burd, *Android Application Development All in one for Dummies*, 3rd edition, July 2020
3. Mark L Murphy, *Beginning Android*, Apress, 1st edition, 2009

Laboratory/ Tutorial Work

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

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SVKM's NMIMS
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Program: Master of Computer Application (MCA)				Semester : II	
Course : Software Engineering				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- 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 - <ol style="list-style-type: none"> 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


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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. State diagram, Activity diagram, Modeling interaction and behaviour, Sequence and Collaboration Diagram.	08
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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