RAMAIAH
Institute of Technology

CURRICULUM

for the Academic year 2021 – 2022

MASTER OF COMPUTER APPLICATIONS

V & VI SEMESTER MCA

RAMAIAH INSTITUTE OF TECHNOLOGY
(Autonomous Institute, Affiliated to VTU)
Bangalore – 560054.

About the Institute

Dr. M. S. Ramaiah a philanthropist, founded 'Gokula Education Foundation' in 1962 with an objective of serving the society. M S Ramaiah Institute of Technology (MSRIT) was established under the aegis of this foundation in the same year, creating a landmark in technical education in India. MSRIT offers 17 UG programs and 15 PG programs. All these programs are approved by AICTE. All eligible UG and PG programs are accredited by National Board of Accreditation (NBA). The institute is accredited with **'A$^+$' grade by NAAC in March 2021** for 5 years. University Grants Commission (UGC) & Visvesvaraya Technological University (VTU) have conferred Autonomous Status to MSRIT for both UG and PG Programs since 2007. The institute is a participant to the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. The institute has 380 competent faculty out of which 60% are doctorates. Some of the distinguished features of MSRIT are: State of the art laboratories, individual computing facility for all faculty members, all research departments active with sponsored funded projects and more than 300 scholars pursuing Ph.D. To promote research culture, the institute has established Centre of Excellence for Imaging Technologies, Centre for Advanced Materials Technology, Centre for Antennas and Radio Frequency systems (CARFS), Center for Cyber Physical Systems & Schneider Centre of Excellence. **M S Ramaiah Institute of Technology has obtained "Scimago Institutions Rankings" All India Rank 65 & world ranking 578 for the year 2020.**

The Entrepreneurship Development Cell (EDC) and Section 8 company "Ramaiah Evolute" have been set up on campus to incubate startups. **M S Ramaiah Institute of Technology secured All India Rank 8th for the year 2020 for Atal Ranking of Institutions on Innovation Achievements (ARIIA), by MoE, Govt. of India.** MSRIT has a strong Placement and Training department with a committed team, a good Mentoring/Proctorial system, a fully equipped Sports department, large air-conditioned library with good collection of book volumes and subscription to International and National Journals. The Digital Library subscribes to online e-journals from Elsevier Science Direct, IEEE, Taylor & Francis, Springer Link, etc. MSRIT is a member of DELNET, CMTI and VTU E-Library Consortium. MSRIT has a modern auditorium and several hi-tech conference halls with video conferencing facilities. The institute has excellent hostel facilities for boys and girls. MSRIT Alumni have distinguished themselves by occupying high positions in India and abroad and are in touch with the institute through an active Alumni Association.

As per the National Institutional Ranking Framework (NIRF), MoE, Government of India, M S Ramaiah Institute of Technology has achieved 65th rank among 1143 top Engineering institutions of India for the year 2021 and is 1st amongst the Engineering colleges affiliated to VTU, Karnataka.

ABOUT THE DEPARTMENT

The Department of Master of Computer Applications was established in 1997 with the objective of producing high quality professionals to meet the demands of the emerging field of Computer Applications. The department got academic autonomy in the year 2007 and is accredited by NBA. The department is recognized as a Research Centre under Visvesvaraya Technological University in 2012.

VISION OF THE INSTITUTE

To be an Institution of International Eminence, renowned for imparting quality technical education, cutting edge research and innovation to meet global socio-economic needs

MISSION OF THE INSTITUTE

MSRIT shall meet the global socio-economic needs through
1. Imparting quality technical education by nurturing a conducive learning environment through continuous improvement and customization
2. Establishing research clusters in emerging areas in collaboration with globally reputed organizations
3. Establishing innovative skills development, techno-entrepreneurial activities and consultancy for socio-economic needs

QUALITY POLICY

We at M. S. Ramaiah Institute of Technology strive to deliver comprehensive, continually enhanced, global quality technical and management education through an established Quality Management System complemented by the synergistic interaction of the stake holders concerned

VISION OF THE DEPARTMENT

To be a nationally prominent and internationally recognized department in academics and research activities with the aim of developing competitive software professionals to serve the society and ever changing industry.

MISSION OF THE DEPARTMENT

1. To enable the students to be knowledgeable and creative through state-of-the-art curriculum and innovative teaching methodologies
2. To provide training programs that bridges the gap between academia and industry to produce competitive software professionals
3. To inculcate ethical values in the students enabling them to become socially committed professionals
4. To enhance the research quality and productivity, by providing required facilities

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1. Excel in professional career in the field of Computer Applications and contribute to research and development activities.

PEO2. Provide software solutions that are socially acceptable and adapt emerging technologies and tools.

PEO3. Exhibit ethical and communication skills and engage in lifelong learning.

PROGRAM OUTCOMES (POs):

PO1: Apply knowledge of mathematics and computing principles appropriately to develop conceptual model for real world problems.

PO2: Identify and formulate problem definition for real world problems, analyse the literature of the domain and provide solutions using mathematics and computing**.**

PO3: Design, develop and assess a software system, process, component, or program of varying complexity that meet specified needs with appropriate consideration for public health and safety and societal considerations.

PO4: Use research based knowledge to analyse and interpret data and synthesize information to provide valid conclusions.

PO5: Adapt to understand, select, use and create modern tools and technologies necessary for computing practices.

PO6: Adopt professional ethics, principles of professional computing practices, cyber regulations and responsibilities.

PO7: Recognize the need and engage in self-learning for continual development as a computing professional.

PO8: Apply the management principles for managing projects as an individual, as a member and as a leader in a team under multidisciplinary environments.

PO9: Communicate effectively about computing activities in both verbal and written form with the computing community and with society.

PO10: Assess the local and global impact of software solutions on individuals, organizations and society.

PO11: Perform effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.

PO12: Adopt standardized software engineering practices with innovative ideas to succeed as an employee or entrepreneur.

Curriculum Course Credits Distribution

| Semester | Mathematics (MTH) | Management (MGT) | Humanities & Social Sciences (HSS) | Professional Courses | | Project Work / Internship (PW /IN) | Seminar (SEM) | Co-Curricular Activities (CCA) | Total credits in a Semester |
				Core (Hard core, Soft core, Lab) (PC-C)	Electives (PC-E)				
First	4		3	15					22
Second		3		18			1		22
Third				16	6				22
Fourth				12	9		1		22
Fifth				11	9				20
Sixth						22		2	24
Total	**4**	**3**	**3**	**72**	**24**	**22**	**2**	**2**	**132**

SCHEME FOR 2019-2022 BATCH

I SEMESTER

S. No	Course Code	Course Name	Credits*			
			L	T	P	Total
1.	MCA11	Problem Solving Using 'C'	2	1	1	4
2.	MCA12	Discrete Mathematics	3	1	0	4
3.	MCA13	Fundamentals of Computer Organization	4	0	0	4
4.	MCA14	Introduction to UNIX	3	0	1	4
5.	MCA15	Professional Communication and Ethics	2	1	0	3
6.	MCA16	Topics in Web Programming	0	1	2	3
		Total	**14**	**4**	**4**	**22**

II SEMESTER

S. No	Course Code	Course Name	Pre-requisite Course(s)	Credits*			
				L	T	P	Total
1.	MCA21	Object Oriented Programming with C++	MCA11	2	1	1	4
2.	MCA22#	Data Analysis using Spreadsheets	-	0	1	2	3
3.	MCA23	Database Management Systems	-	3	0	1	4
4.	MCA24	Data Structures Using 'C'	MCA11	3	0	1	4
5.	MCA25	Management Information Systems	-	3	0	0	3
6.	MCA26#	JavaScript Frameworks	MCA16	0	1	2	3
7.	MCAS1	Seminar I					1
		Total		**11**	**3**	**7**	**22**

III SEMESTER

S. No	Course Code	Course Name	Pre-requisite Course(s)	Credits*			
				L	T	P	Total
1	MCA31	Operating Systems		4	0	0	4
2	MCA32	Design and Analysis of Algorithms	MCA24	3	0	1	4
3	MCA33	Software Engineering		4	0	0	4
4	MCA34	Programming in Java	MCA21	3	0	1	4
5	MCAE--	Elective I					3
6	MCAE--	Elective II					3
		Total					**22**

IV SEMESTER

S. No	Course Code	Course Name	Pre-requisite Course(s)	L	T	P	Total
1	MCA41	Computer Networks	-	3	0	1	4
2	MCA42	Programming with Python	MCA16, MCA21	3	0	1	4
3	MCA43	Machine Learning	MCA12	3	0	1	4
4	MCAE--	Elective III					3
5	MCAE--	Elective IV					3
6	MCAE--	Elective V					3
7	MCAS2	Seminar II					1
		Total					**22**

V SEMESTER

S. No	Course Code	Course Name	Pre-requisite Course(s)	L	T	P	Total
1	MCA51	Object Oriented Modeling and Design Patterns	MCA21	3	0	1	4
2	MCA52	Information Security		3	0	1	4
3	MCASC-	Soft-core Course		3	0	0	3
4	MCAE--	Elective VI					3
5	MCAE--	Elective VII					3
6	MCAE--	Elective VIII					3
		Total					**20**

SOFTCORE COURSES

S. No	Course Code	Course Name	L	T	P	Total
1	MCASC1	Supply Chain Management	3	0	0	3
2	MCASC2	Software Project Management	3	0	0	3
3	MCASC3	Enterprise Resource Planning	3	0	0	3

VI SEMESTER

S. No	Course Code	Course Name	L	T	P	Total
1.	MCA61	Project Work				22
2.	MCACCA	Co-Curricular Activities				2
		Total				**24**

Students have to acquire 2 credits by accomplishing any one of the following Co-Curricular Activities within the duration of the Programme (MCACCA):
- On-line Certification Course
- Internship of 8-weeks followed by a report and presentation
- Paper Publication in International Conference along with a report and presentation
- Clearing one level in any of the recognized competitions

ELECTIVE COURSES

S. No	Course Code	Course Name	Pre-requisite Course(s)	L	T	P	Total
1.	MCAE01#	User Interface and User Experience Design		0	1	2	3
2.	MCAE02	Operations Research		2	1	0	3
3.	MCAE03#	Hadoop Ecosystem		0	1	2	3
4.	MCAE04#	Web Programming with PHP and AJAX	MCA16	0	1	2	3
5.	MCAE05#	Computer Graphics and Animation		0	1	2	3
6.	MCAE06	Secure Coding in C and C++	MCA21	2	0	1	3
7.	MCAE07#	NoSQL Databases	MCA23	0	1	2	3
8.	MCAE08#	Mobile Application Development		0	1	2	3
9.	MCAE09#	Web Component Development with J2EE	MCA34	0	1	2	3
10.	MCAE10	Programming with C#.Net	MCA21	2	0	1	3
11.	MCAE11	Digital Forensics		2	0	1	3
12.	MCAE12	System Modeling and Simulation		2	0	1	3
13.	MCAE13#	Cloud Computing	MCA31, MCA41	0	1	2	3
14.	MCAE14#	Software Testing	MCA33	0	1	2	3
15.	MCAE15#	Programming IoT	MCA42	0	1	2	3
16.	MCAE16#	ASP.Net with C#	MCA16, MCA21	0	1	2	3
17.	MCAE17	UNIX Systems Programming	MCA14, MCA31	2	0	1	3
18.	MCAE18	Deep Learning	MCA43	2	0	1	3
19.	MCAE19	Storage Area Networks		2	0	1	3
20.	MCAE20#	Introduction to Big Data Analytics using SPARK		0	1	2	3
21.	MCAE21	Soft Skills and Personality Development		2	1	0	3
22.	MCAE22	Management and Entrepreneurship		3	0	0	3
23.	MCAE23	Agile Software Development	MCA33	2	0	1	3
24.	MCAE24	Social Network Analysis		2	0	1	3

#Semester End Examination will be conducted for Laboratory
* L: Lecture   T: Tutorial   P: Practical

V SEMESTER

Object Oriented Modeling and Design Patterns

Course Code: MCA51   **Credits: 3:0:1**
Prerequisite: MCA21   **Contact Hours: 42L 28P**
Course Coordinator:

UNIT I

Introduction, Modeling Concepts, Class Modeling: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history.

Modeling as a Design Technique: Modeling; abstraction; the three models.

Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models.

Advanced Class Modeling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes.

UNIT II

Advanced Class Modeling: Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages.

State Modeling, Interaction Modeling: State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior.

Interaction Modeling: Use case models; Sequence models; Activity models.

Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT III

Analysis Process Overview, System Conception, Domain Analysis:

System Conception: Devising a system concept; elaborating a concept; preparing a problem statement.

Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

Application Analysis: Application interaction model; Application class model; Application state model; adding operations.

UNIT IV

Class Design, Implementation Modeling, Legacy Systems

Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recurring downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.

Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; realizing associations; Testing.

Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

UNIT V

Design Patterns

Introduction: What is a design pattern, describing design patterns, how design patterns solve design problems, how to select a design pattern, how to use a design pattern

Creational Patterns – Factory Method, Singleton

Structural Patterns – Adapter, Proxy

Behavioral Pattern – Command, Observer

Laboratory

- Develop Object Oriented Analysis and design models for a real world problem
- Identify the model elements
- Draw the necessary diagrams in UML, using any UML tool
- Generate source code in Java/C++/C#
- Identify any two design patterns relevant to the problem and generate code using tool

Text Books:

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, Prentice Hall of India, 2005. Chapters 1 to 5, 7 to 13, 15 to 17 and 23
2. E. Gamma, R. Helm, R. Johnson, J. Vlissides: Design Patterns- Elements of Reusable Object- Oriented Software, Addison-Wesley, 1995.

Reference Books:

1. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rdEdition, Pearson Education, 2007.
2. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2011.
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, Wiley- Dreamtech India, 2004.

Course Outcomes (COs):

1. Apply the concept of object oriented modeling and design techniques. (PO – 1,5,9,11,12)
2. Use the notations of class, state, use case, sequence and activity diagrams and various UML notations. (PO – 1,5,7,9,11,12)
3. Analyze the domain, application artifacts, and construct domain model and application model. (PO – 1,2,3,5,7,9,11,12)
4. Design classes using suitable design techniques and implement the Models. (PO – 1,2,3,5,7,9,11,12)
5. Explain the legacy systems, implementation modeling and design patterns. (PO – 1,2,3,5,9,11)

Information Security

Subject Code: MCA52   **Credits: 3:0:1**
Prerequisite: Nil   **Contact Hours: 42L 28P**
Course Coordinator:

UNIT I

Introduction to Information Security: What Is Security? Components of an Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, The Security Systems Development Life Cycle
The Need for Security: Threats, Attacks
Legal, Ethical, and Professional Issues in Information Security: Ethics and Information Security, Codes of Ethics and Professional Organizations.

UNIT II

Risk Management: Risk Identification, Risk Assessment, Risk Control Strategies, selecting a Risk Control Strategy, Quantitative Versus Qualitative Risk Control Practices
Security Technology: Firewalls and VPNs, Access Control, Firewalls, Protecting Remote Connections.

UNIT III

Security Technology: Intrusion Detection and Prevention Systems, and Other Security Tools: Intrusion Detection and Prevention Systems, Honeypots, Honeynets, and Padded Cell Systems, Scanning and Analysis Tools, Biometric Access Controls
Implementing Information Security: Information Security Project Management, Technical Aspects of Implementation, Non-technical Aspects of Implementation.

UNIT IV

Symmetric Ciphers: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography
Block Ciphers and the Data Encryption Standard: Block Cipher Principles, The Data Encryption Standard, The Strength of Des
Advanced Encryption Standard, Evaluation Criteria For AES, The AES Cipher.

UNIT V

Public-Key Encryption and Hash Functions, **Public-Key Cryptography and RSA:** Principles of Public-Key Cryptosystems The RSA Algorithm

Key Management; **Other Public-Key Cryptosystems,** Key Management, Diffie-Hellman Key Exchange

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs.

Laboratory

- Experiments on different security attacks, vulnerability assessment and other techniques using open source tools

Text Books:

1. Michael E. Whitman, Herbert J. Mattord: Principles of Information Security, 5th Edition, Cengage Learning, 2012. (Selected Portion from Chapters 1,2,3, 5,6,7,10).
2. William Stallings: Cryptography and Network Security-Principles and Practices, 4th Edition, Prentice Hall, (Chapters 2.1 to 2.5, 3.1 to 3.3, 3.5, 5.1 to 5.2, 9.1 to 9.2, 10.1 to 10.2, 11.1 to 11.5).

Reference Books:

1. Behrouz A Forouzan: Cryptography and Network Security, 3rd Edition, 2015, Tata McGraw Hill.
2. R. Kelly Rainer, Casey G. Cegielski: Introduction to Information Systems, 4th Edition, Wiley India.
3. Mark Merkow, James Breithaupt: Information Security: Principles and Practices, Pearson Education.

Course Outcomes (COs):

1. Describe the basic concepts of information security, its need, legal, ethical and professional issues associated with it. (PO-1, 6)
2. Determine risks and its controlling mechanisms, and discuss importance of firewalls and VPN in the context of network security. (PO-1,5,7,10)
3. Discuss different security technologies and implementation of information security. (PO-1,3,5,7,10)
4. Apply symmetric key cryptography and encryption standards. (PO-1,3,5,7,10)
5. Explain public-key cryptography and hash functions. (PO-1, 3, 5,7,10)

Software Project Management

Subject Code: MCASC2   **Credits: 3:0:0**
Prerequisite: Nil   **Contact Hours: 42L**
Course Coordinator:

UNIT I

Introduction to Software Project Management and Project Evaluation: Importance of Software Project Management, Activities, Methodologies, Categorization of Software Projects, Setting objectives, Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation.

UNIT II

Project Planning and Effort Estimation: Stepwise Project Planning, Basics of Software estimation, Effort estimation techniques, COSMIC Full function points, COCOMO II A Parametric Productivity Model.

UNIT III

Project Approach Selection and Activity Planning: Software process and Process Models, Choice of Process models, Rapid Application development, Agile methods, Extreme Programming, SCRUM, Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Forward Pass and Backward Pass techniques, Critical path (CRM) method.

UNIT IV

Risk Management and Project Monitoring: Risk identification, Assessment, Monitoring, PERT technique, Framework for Management and control, Collection of data Project termination, visualizing progress, Cost monitoring, Earned Value Analysis-Project tracking, Change control - Software Configuration Management.

UNIT V

Resource Allocation and Software Quality: Resource Allocation, Creation of critical paths, Software Quality in Project Planning, Software Quality Models, Product and Process Metrics and Quality Management, Quality Management Systems, Process Capability Models.

Text Books:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management, 6th Edition, Tata McGraw Hill, New Delhi, 2018.

Chapters: 1.1 to 1.16, 2.1 to 2.6, 3, 4.1 to 4.5, 4.13 to 4.16, 5.1 to 5.13, 6, 7.1 to 7.12, 8.1 to 8.5, 9, 13.1 to 13.5, 13.7 to 13.10.

Reference Books:

1. Robert K. Wysocki: Effective Software Project Management, Wiley Publication, 2011.
2. Walker Royce: Software Project Management, Addison-Wesley, 1998.
3. Gopalaswamy Ramesh: Managing Global Software Projects, McGraw Hill Education (India), Fourteenth Reprint, 2013.

Course Outcomes (COs):

1. Discuss the scope of software project management and adapt the software project evaluation principles. (PO-1,2,4,6,8,9,10)
2. Explain the project planning approach and apply the software effort estimation techniques. (PO-1,2,4,6,8,9,12)
3. Determine the appropriate process model and produce activities plan (PO-1,2,4,8,9,12)
4. Manage the risks, monitor the progress of projects and manage the change control. (PO-1,2,4,6,8,9)
5. Handle the resource allocation and practice the software quality standards. (PO-1,2,4,6,8,9,12)

Mobile Application Development

Course Code: MCAE08   **Credits: 0:1:2**
Prerequisite: Nil   **Contact Hours: 28T 56P**
Course Coordinator:

Topics to be Covered in Tutorial

- Introduction to android, features, Android Architecture
- Exploring linear layout and Relative layout
- Exploring widgets
- Android activity life cycle
- Intents in Android, Shared preferences
- Fragments in android
- Animations
- Databases and content providers
- Services
- Sensors and location based services
- Audio playback and image capture
- Introduction to frameworks (Cordova, Phonegap)

Laboratory

- Programs supplement the tutorial concepts will be based on the latest version of Android.
- Mini Project

Reference Books:

1. Reto Meier: Professional Android 4 Application Development. Wiley India Edition, 2012.
2. Jerome (J.F.) Di Marzio: Android A Programmer's Guide, Tata McGraw-Hill, 2010.
3. B.M. Harwani: Android Programming, Pearson, 2013.
4. Jason Ostrander: Android UI Fundamentals Develop and Design, Pearson, 2014.
5. John Horton: Android Programming for Beginners, Packt publishing, 2015.
6. Nanjesh Bennur, Deepesh R, Dr. Niranjanamurthy M: Fundamentals of Mobile Application Development First Edition, InSc Publishing house, 2019.
7. **Web Reference:** Any Google developer sites

Course Outcomes (COs):

1. Describe the Android SDK, Development Framework and Demonstrate Android Application Life Cycle. (PO-1,2,3,5)
2. Apply the Android UI and animations API for enhancing the user experience and developing advanced applications. (PO - 1,2,3,5,7,10,11)
3. Develop the Android Applications using sensors, location based services, databases and Background services. (PO - 1,2,3,5,7,10,11,12)

Cloud Computing

Course code: MCAE13   **Credits: 0:1:2**

Prerequisites: MCA31, MCA41   **Contact Hours: 28T 56P**

Course Coordinator:

Concepts to be covered in Tutorial

- Introduction to Cloud Computing
- Comparison of SaaS, PaaS, IaaS in detail.
- Familiarity of different services provided by AWS
- Working with Amazon EC2, and S3 services
- Back up and Launch a new instance using Back-up.
- Elastic IPs and AWS Identity and Access Management(IAM).
- Hosting Static Website and Hosting Applications in AWS
- Working with AWS RDS: MySQL Workbench and Dynamo DB
- Resource management in cloud: Load Balancer and Auto Scaling Group
- AWS-Eclipse Integration
- Connect RDS and Java Applications
- Data Analytics, Security

Laboratory

- Familiarize the services by AWS
- Creating user login
- Creating Linux, Windows virtual machines instance using EC2
- Run simple applications on EC2 Instance
- Creating Storage using S3
- Create a Backup using Image and launch new instance using Backup image
- Creating an RDS Instance with MySQL Workbench and Dynamo DB
- Demonstrate Database application on AWS
- Upgrading and downgrading the infrastructure based on the requirement
- Demonstrate Load balancing using different instance of EC2
- Launch a web application.
- Demonstrate Identity and Access management.
- Demonstrate Elastic bean stack
- Demonstrate AWS dynamic web application.
- Demonstrate Data Analytics using Elastic Map Reduce (EMR)

References:

1. Rajkumar Buyya, ChristaianVecchiola, S. ThamaraiSelvi, Master Cloud Computing, TMH Education, 2013.
2. Arshdeep Bahga, Vijay Madisetti, Cloud Computing: A Hands-on Approach, Universities Press, 2014.
3. https://aws.amazon.com/training/intro_series/
4. https://aws.amazon.com/getting-started/
5. https://aws.amazon.com/
6. https://aws.amazon.com/free/
7. https://blog.webspecia.com/cloud/iaas-paas-saas-explained-examples-comparison
8. http://aws.amazon.com/training/self-paced-labs/
9. Instructor led AWS Training - http://aws.amazon.com/training/

Course Outcomes (COs):

1. Build private cloud and launch instances using AWS services. (PO-1,2,3,5,7)
2. Demonstrate database, EMR, auto scaling, load balancer and IAM services on AWS. (PO-1,2,3,5,7)
3. Develop AWS Dynamic Web Application and Migrate Applications on AWS. (PO-1,2,3,5,7)

Programming IoT

Course Code: MCAE15   **Credits: 0:1:2**
Prerequisite: MCA42   **Contact Hours: 28T 56P**
Course Coordinator:

Concepts to be covered in Tutorial

- Introduction to Internet of Things (IoT)
- IoT enabling technologies and IoT levels
- Python Programming with Raspberry Pi
- Working with Arduino
- Working with Sensors on Raspberry Pi and Arduino
- Case study on Home Intrusion Detection
- Introducing Cloud platform for IoT
- Introduction to IoT with Machine Learning

Laboratory

- Familiarity with Raspberry Pi
- Exploring the different components of Raspberry pi
- Setting up of the board and booting the board
- Practice sessions on Python
- Working with different sensors on Raspberry Pi
- Simple application development using Raspberry Pi and Python
- Familiarity with Arduino
- Exploring the different components of Arduino
- Setting up of the board and booting the board
- Working with different sensors on Arduino
- Working with Cloud platform.
- Working with simple IoT applications using Machine Learning
- Project work.

References:

1. Arshdeep Bahga, Vijay Madisetti: Internet of Things: A Hands onApproach, Universities Press, 2015
2. Simon Monk: Programming the Raspberry Pi: Getting Started with Python, McGrawHill, 2nd Ed, 2015
3. Simon Monk: Raspberry Pi Cookbook, May 2016, O'Reilly
4. www.raspberrypi.org
5. http://forefront.io/a/beginners-guide-to-arduino/
6. https://www.arduino.cc/en/Tutorial/HomePage

Course Outcomes (COs):

1. Configure and set up the Raspberry Pi board for a given application. (PO-1,2,3,5)
2. Configure and set up the Arduino board for a given application. (PO-1,2,3,5)
3. Building IoT applications using Cloud and Machine Learning. (PO-1,2,3,4,5,6,7,8,9,10,11,12)

ASP.Net with C#

Course code: MCAE16   **Credits: 0:1:2**
Prerequisites: MCA16, MCA21   **Contact Hours:28T 56P**
Course Coordinator:

Concepts to be covered in Tutorial

- Introduction to C#, Classes.
- Concepts ASP.NET Framework, and Applications
- Working with Standard, List, Rich and Validation Controls.
- Building Data Access Components with ADO.NET
- Working with GridView, Repeater, Data list and Navigation Controls.
- Concepts of LINQ to SQL.
- Designing websites with Master pages.
- Maintaining applications states in ASP .NET

Exercises for Laboratory:

- Creating ASP.NET Applications
- Demonstrate the use of Standard and list controls
- Demonstrate the use of Rich and validation controls
- Design and develop an application to connect to a Database with ADO.NET and display using GridView.
- Design and develop an application to connect to a Database with ADO.NET and display using Repeaters.
- Design and develop an application to connect to a Database with ADO.NET and display using DataList Controls.
- Design and Develop an Application using Navigation controls.
- Demonstrate and Data Access with LINQ to SQL.
- Design and Develop an application to demonstrate the concepts of Master pages
- Demonstrate Applications state using cookies
- Demonstrate Applications state using sessions.

References:

1. Herbert Schildt: Complete Reference C# 4.0, Tata McGraw Hill, 2010.
2. .NET 4.5 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiley- Dream Tech Press.
3. Paul Deitel and Harvey Deitel: C# 2010 for Programmers, 4th Edition, Pearson Education.
4. Andrew Troelsen: Pro C# 5.0 and the .NET 4.5 Framework, 6th Edition, Apress.

5. Bart De Smet: C# 4.0 Unleashed, Pearson Education- SAMS Series.

Course Outcomes (COs):

1. Develop Interactive Web Applications using various Controls.
   (PO - 2, 3, 5, 6, 8, 10,11,12)
2. Demonstrate the use of ADO.NET for Web Applications.
   (PO - 2, 3, 5, 6, 8, 10,11,12)
3. Acquire Skills to use technologies like master pages and LINQ to develop highly responsive web applications (PO - 2, 3, 5, 6, 8, 10,11,12)

Soft Skills and Personality Development

Course Code: MCAE21   **Credits: 2:1:0**
Prerequisite: Nil   **Contact Hours: 28L 28T**
Course Coordinator:

UNIT I

Introduction to Personality Development: The concept of personality - Dimensions of personality – Theories of Freud & Erickson-Significance of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis.

UNIT II

Attitude & Motivation: Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages Ways to develop positive attitude - Concept of motivation - Significance – Internal and external motives - Importance of self- motivation- Factors leading to de-motivation
Self-esteem: Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem Character building -Team-work – Time management

UNIT III

Employability Quotient: Resume building- The art of participating in Group Discussion – Facing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.
Introduction to the Soft Skill Development. Soft skills vs. hard skills. Broad range of soft skills, focus on communication and interacting skills.

UNIT IV

Role of self-awareness. Strengths and weaknesses of our personality, behaviour, thinking, and style of interacting with others: what works and what doesn't**.**
Communication / Interaction Skills and Interpersonal Effectiveness: Asking questions. Handling responses to questions and responding. Giving feedback. Receiving feedback
Influencing Skills: Understanding power and influence. Influence strategies and tactics. Sources of power. Influencing different types. Resisting influencing.

UNIT V

Building Collaboration. Principles of collaboration. Collaboration and influences.

Stimulating Creative Thinking in Communications. Stimulating creativity. Brainstorming interventions. Facilitating problem solving. Building consensus. Techniques for narrowing options. Technics for exploring disagreement. Handling disruptive behaviour. Testing for consensus.

Text Books:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Bacon, T., Interpersonal and interactive Skills, Lore Institute, 1996.

Course Outcomes (COs):

1. Identify the various dimensions of personality and the factors that affect both success and failures (PO -5,8)
2. Discuss the importance and the methodology to have a positive attitude and proper self – esteem. Identify how to be self-motivated and to motivate others. (PO -5,7,8)
3. Describe the factors affecting employability Quotient and identify the basics of soft skills.
   (PO -5,7,8,11)
4. Illustrate the communication / interaction skills and interpersonal effectiveness. Illustrate the skills of influencing others and skills of working in a team. (PO -5,7,11)
5. Apply and understand the skills needed to stimulating Creative Thinking in Communications. (PO -8,11)

Agile Software Development

Course Code: MCAE23   **Credits: 2:0:1**
Prerequisite: MCA33   **Contact Hours: 28L 28P**
Course Coordinator:

UNIT I

Introduction
What is Agile? The history of Agile, The Agile Manifesto, Agile Principles. Why Agile? – Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility. How to Be Agile – Agile Methods, Don't Make your own Method, The Road to Mastery, Find a Mentor.

UNIT II

Overview of Extreme Programming: XP Concepts
Agile Design: Symptoms of Poor Design, Principles, Smells and Principles, what is Agile Design? What Goes Wrong with Software? How did the Agile Developers Know What to Do? Keeping the Design as Good as It Can Be.

UNIT III

Agile Frameworks: Dynamic system development method(DSDM), Agile Project Management, Kanban, Lean Software Development, Lean Start-up, Scaled Agile Framework (SAFe).
Agile Development:
Planning: Initial Exploration, Release Planning, Iteration Planning, Task Planning, Iterating.
Testing: Test Driven Development (TDD), Acceptance tests, Exploratory testing.

UNIT IV

Mastering Scrum
Introduction: What is Scrum? Scrum origins, Why Scrum? Get Ready for Scrum: Scrum is Different, Self-Organization, Incremental product Delivery. Scrum practices: The Scrum Master, product Backlog, Scrum Teams, Daily Scrum Meetings, Sprints, Sprint Planning Meeting, Sprint Review. Applying Scrum: Implementing Scrum, Business value through Collaboration, Empirical Management, managing a Sprint, Managing a release. Why Scrum? Noisy Life, Noise in System Development Projects, Why Current System Development Methodologies Don't Work? Why Does Scrum Works?

UNIT V

Introduction to DevOps: What is DevOps, Why is DevOps is Needed ,How is DevOps different from traditional IT , Agile vs DevOps, DevOps Lifecycle,

stages and tools, Work Flow and Principles. Roles, Responsibilities and Skills of a DevOps Engineer.

Laboratory

Programs that supplement the theory concepts are to be implemented.

Text Books:

1. Agile Software Development: Principles, Patterns, and Practices, Robert C. Martin with contributions by James W. Newkirk and Robert S. Koss, Pearson Education, 2014.
2. The Art of Agile Development: James Shore, Chromatic, O′Reilly; 1st Edition, 2007.

Reference Books:

1. Effective DevOps: Building A Culture Of Collaboration, Affinity, And Tooling At Scale- Jennifer Davis, Ryn Daniels- 1st Edition - Shroff/O'Reilly, 2016.
2. DevOps with OpenShift: Cloud Deployments Made Easy- Stefano Picozzi- 1st Edition, Shroff/O'Reilly, 2017.
3. Agile Foundations: Principles, Practices and frameworks, Peter Measey and Radtac, Viva Books Private Limited, 2015.
4. Agile Software Development with Scrum, Ken Schwaber and Mike Beedle, Pearson Indian Edition, 2007.

Web References:

1. https://www.guru99.com/devops-tutorial.html
2. https://www.javatpoint.com/devops

Course Outcomes (COs):

1. Describe the Agile Principles and Methods for real world applications. (PO-1,2,3,5,9)
2. Apply Agile Design and Extreme Programming for specific practices to develop/Manage the applications. (PO-1,2,3,5,9)
3. Demonstrate the Agile Frameworks, Task Planning and Testing for developing quality application. (PO-1,2,3,5,9)
4. Demonstrate the agile software development using Scrum. (PO-1,2,3,5,9, 11)
5. Illustrate the DevOps stages, tools and work culture. (PO-1,2,3,5)

VI SEMESTER

PROJECT WORK

Course Code: MCA61   **Credits: 22**

DISSERTATION WORK GUIDELINES

- The topic and title of the dissertation shall be chosen by the candidate in consultation with the guide and co-guide. However, modification of the title is permitted at the time of submission of dissertation report. The subject and topic of dissertation shall be from the major field of studies of the candidate.

- The dissertation work shall be carried out by each candidate independently under the guidance of one of the faculty members of the Department.

- If dissertation has to be carried out in any industry/factory/organization, outside the campus, the permission to that effect and the name of co-guide at any of these organizations shall be intimated to the Head of the Department.

- At the end of the semester each candidate shall submit a report of the dissertation work duly approved by the guide. The dissertation work shall be countersigned by the co-guide (if any) and Head of the Department.

- The candidate shall submit Two copies of the dissertation work to the Head of the Department. Duration of the dissertation work shall be 5 months. A separate calendar of events for submission of dissertation and viva-voce shall be fixed and will be notified by the Chairman of Board of Exam (BoE). The candidates who fail to submit the dissertation work within the stipulated time have to submit the same at the time of next ensuing examination.

- The dissertation shall be evaluated by two examiners-one internal and one external, appointed by the Chairman of BoE. The evaluation of the dissertation shall be made independently by each examiner. During the evaluation of the dissertation if anyone of the examiner/both/feels that the candidate is not getting the minimum marks for passing, he/they shall notify to the Chairman of BoE stating specific reasons for rejection and suggestions for resubmission. The viva-voce examination of such candidates shall not be conducted. The resubmitted dissertation may preferably send to the same examiners for the re-examination.

- The candidate may also choose another topic of dissertation under a new guide, if necessary. In such case dissertation may be submitted within 6 years from the date of admission to the course. A different set of examiners

shall be constituted for evaluation of dissertation under such circumstances by the Chairman of BoE.

- A copy of the dissertation shall be sent to both the examiners by the Chairman of BoE.

- Both the examiners shall evaluate the dissertation normally within a period of not more than 3 weeks from the date of receipt of the dissertation. The external examiner shall be contacted by the head of the department to arrive at a convenient date for the conduct of viva-voce of the batch students allotted to the external examiner.

- The relative weightage for the evaluation of dissertation and the performance of the viva-voce shall be as per the scheme.

- Both the examiners shall evaluate the dissertation independently and marks shall be awarded jointly at the time of viva-voce examination.

- The viva-voce examination will be conducted jointly by the internal and external examiners and marks shall be awarded jointly. The marks shall be sent to the Controller of Examinations immediately after examination.

Note: All the above guidelines are subjected to the approval by the Chairman of Board of Studies, from time to time.

Rubrics for Evaluation

Performance Indicator (%weightage)	Very Poor	Poor	Average	Good	Very Good
% Marks to be awarded	0-49	50-59	60-74	75-89	90-100
Problem Definition	Purpose and need of the Project is not at all explained	Purpose and need of the Project is satisfactorily explained	Purpose and need of the Project is moderately explained	Purpose and need of the project is explained well	Purpose and need of the project is very well explained
Study of existing system/Li	Existing systems are not studied. Documents	Existing systems are satisfactorily studied.	Existing systems are moderately studied.	Existing systems are well studied.	Existing systems are very well studied.

Performance Indicator (%weightage)	Very Poor	Poor	Average	Good	Very Good
% Marks to be awarded	0-49	50-59	60-74	75-89	90-100
terature survey	of very poor standards, online resources and books are studied.	Documents of satisfactory standards, online resources and books are studied	Documents of average standards, online resources and books are studied.	Documents of good standards like international journal/conference papers, good online resources and books are studied.	Documents of high standards like IEEE papers, reputed online resources and books are studied
Requirements Specifications	Objectives of the proposed work are either not defined properly or incomplete	Only few objectives of the proposed work are well defined	Most of the objectives of the proposed work are well defined	All objectives of the proposed work are well defined	All objectives of the proposed work are very well defined.
Design (High Level Design)	Steps to be followed to solve the defined problem are not at all specified. Design Methodology used is not correct and is not justified	Steps to be followed to solve the defined problem are not specified properly. Design Methodology used is ambiguous and not justified	Steps are mentioned but are unclear; without justification to objectives Appropriate design Methodology is used but not justified properly	Steps to be Followed to solve the defined problem is specified but detailing is not done. Suitable design Methodology is used and properly justified	Steps to be followed to solve the defined problem are clearly specified. Most suitable design. Methodology is used and is properly justified

Performance Indicator (%weightage)	Very Poor	Poor	Average	Good	Very Good
% Marks to be awarded	0-49	50-59	60-74	75-89	90-100
Design (Low level design)	Steps to be followed to solve the defined problem are not at all specified. Design Methodology used is not correct and is not justified	Steps to be followed to solve the defined problem are not specified properly. Design Methodology used is ambiguous and not justified	Steps are mentioned but are unclear; without justification to objectives Appropriate design Methodology is used but not justified properly	Steps to be Followed to solve the defined problem is specified but detailing is not done. Suitable design Methodology is used and properly justified	Steps to be followed to solve the defined problem are clearly specified. Most suitable design. Methodology is used and is properly justified
Implementation	Poor algorithmic approach, improper use of hardware and software tools and programming style, schedules and timelines not met	Few errors in algorithms and programming style, correct choice of hardware and software tools, misses some deadlines	Correct algorithmic approach and choice of tools, meets deadlines and schedule	Technically sound implementation with excellent programming style, finishes well within deadline	Technically sound and professional implementation with excellent programming style, finishes well within deadline
Testing and results	Test plan not created, does haphazard testing, barely meets requirement	Poor planning and specification of test cases, meets functional	Able to identify test plans for most requirements, meets	Clear test plans created, meets almost all requirement	Clear test plans created in advance, meets all requirement,

Performance Indicator (%weightage)	Very Poor	Poor	Average	Good	Very Good
% Marks to be awarded	0-49	50-59	60-74	75-89	90-100
	s, unable to infer results	requirements	requirements	s, optimized solution	optimized solution
Presentation and viva voce	Poor communication skills, poorly organized slide deck, unable to answer technical queries	Reasonably good communication and presentation, able to give technical answers to some extent	Good, professional communication, good visual aids, able to give technical answers	Very good professional and technical communication, effective presentation, able to analyze technically and clarify views in viva-voce	Excellent professional and technical communication, effective presentation, able to analyze technically and clarify views in viva-voce
Contribution to team work	Does not perform any duties assigned to the team role	Performs very little duties	Performs little duties	Performs nearly all duties	Performs all duties of assigned team roles
Report Writing	Poor clarity in technical contents and organization, errors in grammar, lacks style and formatting, incomplete	Reasonably good organization and lacks clarity in few topics, complete, few omissions, grammatically correct, lacks style	Sound organization and structure, clear, very few errors, complete, reasonably good style	Very good organization, no technical or grammar errors, concise and precise, complete documentation	Excellent organization, no technical or grammar errors, concise and precise, complete documentation

Course Outcomes (COs):

1. Gather and analyze the requirements of the given application, survey the literature on existing methodologies, techniques and tools in the related area of the problem and analyze their applicability for the solution.
2. Model and design the solution ethically considering social issues.
3. Implement the design, verify, validate and analyze the results.
4. Demonstrate and document the project work efficiently.
5. Contribute as an individual or in a team in development of technical projects

Co-Curricular Activities

Course Code: MCACCA   **Credits: 0:0:2**

Guidelines:

- Students have to acquire 2 credits by accomplishing any one of the following as a self-study component within the duration of the Programme:
    - On-line Certification Course
    - Internship of 8-weeks followed by a report
    - Paper Publication in International Conference along with a report and presentation
    - Clearing one level in any of the recognized competitions
- On-line Certification Course
    - Students can register for any On-line Certification Course in the field of Computer Science/Management for a minimum duration of 8 weeks
    - They have to submit the Course Completion Certificate along with their scores
- Internship of 8-weeks followed by a report
    - Students have to undergo the Internship in any Institute of National repute or any reputed/well-known industry
    - They are expected to submit a report and give a presentation
- Paper Publication in International Conference along with a report and presentation
    - Students have to publish a research paper in a peer-reviewed International Conference.
    - After the conference, he/she has to submit a report and give a presentation
- Clearing one level in any of the recognized competitions
    - Students have to register for any recognized competitions and clear one level
    - The committee has to identify suitable competition and make the students to aware of that

Approval and Evaluation Process:

- Approval and evaluation can be done by the committee along with the concerned proctor
- The students have to get prior approval from the committee to take up the activity
- A stipulated period can be provided for the approval and evaluation process

Course Outcomes (COs):

1. Identify the course/technology to learn.
2. Demonstrate the concepts/technology learnt.
3. Apply the concepts in solving real world problems.

Survey Form

Sl. No.	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	To be responded by the Students of the Department Please respond to the following items keeping in mind your need to acquire Application Development and Management capabilities and skills as against those being offered by the Post Graduate Programme at the Department of Master of Computer Applications at RIT, Bangalore. You may use **tick mark** to indicate your response/Impression.					
1.	The Programme helped me develop the skills to apply knowledge of Mathematics while modeling software applications.					
2.	After undergoing the Programme I am able to apply knowledge of computing while modeling software applications.					
3.	I am now able to apply knowledge of management principles while modeling software applications.					
4.	The Programme lab has enabled me to identify, formulate, analyze literature and provide software solutions to real life computing problems					
5.	The Programme has enlightened me about the various techniques needed to write Research Papers/ Paper Presentations/ White Papers etc.					
6.	I am now able to analyze problems, design and develop solutions.					
7.	The Programme has helped me understand the computing and management principles needed to manage projects as an individual.					
8.	The Programme helped me understand the computing and management principles needed to manage projects as a member in a team.					

9.	After the graduation now I am confidently able to apply the computing and management principles to manage projects in multidisciplinary environments.					
10.	The Programme has convinced me to adopt current technologies necessary for computing practices.					
11.	The Programme taught me to create/use modern tools necessary for computing practices.					
12.	I am being well enlightened about my professional and ethical responsibilities					
13.	I know and am able to follow the cyber regulations.					
14	My Communication Skills both in verbal and written form were refined by the Programme.					
15	The Programme helped me to analyze the local and global impact of software solutions on individuals, organizations and society.					
16	I am now capable to engage myself in self-learning for continual development as a computing professional.					
17	The Programme helped me to adopt standardized software engineering practices.					

Any other Comments:

Name of Respondent:

Affiliation:

Thank you for taking time to complete the questionnaire. Your opinions would be invaluable in improving the quality of our post graduate Programme. Your views will be duly considered.