



RAMAIAH
Institute of Technology

CURRICULUM

For the Academic Year 2019 – 2020

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

III & IV Semester MCA

RAMAIAH INSTITUTE OF TECHNOLOGY

(Autonomous Institute, Affiliated to VTU)

BENGALURU – 560054

About the Institute

Ramaiah Institute of Technology (RIT) (formerly known as M. S. Ramaiah Institute of Technology) is a self-financing institution established in Bangalore in the year 1962 by the industrialist and philanthropist, Late Dr. M S Ramaiah. The Institute is accredited with “A” grade by NAAC in 2014 and all engineering departments offering bachelor degree programs have been accredited by NBA. RIT is one of the few institutes with faculty student ratio of 1:15 and achieves excellent academic results. The institute is a participant of the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. All the departments are full with competent faculty, with 100% of them being postgraduates or doctorates. Some of the distinguished features of RIT are: State of the art laboratories, individual computing facility to all faculty members. All research departments are active with sponsored projects and more than 150 scholars are pursuing PhD. The Centre for Advanced Training and Continuing Education (CATCE), and Entrepreneurship Development Cell (EDC) have been set up on campus. RIT has a strong Placement and Training department with a committed team, a fully equipped Sports department, large air-conditioned library with over 1,35,427 books with subscription to more than 300 International and National Journals. The Digital Library subscribes to several online e-journals like IEEE, JET etc. RIT is a member of DELNET, and AICTE INDEST Consortium. RIT has a modern auditorium, several hi-tech conference halls, all air-conditioned with video conferencing facilities. It has excellent hostel facilities for boys and girls. RIT Alumni have distinguished themselves by occupying high positions in India and abroad and are in touch with the institute through an active Alumni Association. RIT obtained Academic Autonomy for all its UG and PG programs in the year 2007. As per the National Institutional Ranking Framework, MHRD, Government of India, Ramaiah Institute of Technology has achieved 60th rank among the top 100 engineering colleges across India.

About the Department

The Department 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)	Self-Study (SS)	Total credits in a Semester
				Core (Hard core, Soft core, Lab) (PC-C)	Electives (PC-E)				
First	4		3	15				2	22
Second		4		18					22
Third				16	6				22
Fourth				12	9		1		22
Fifth				11	9				20
Sixth						22			22
Total	4	4	3	72	24	22	1	2	132

SCHEME FOR 2018-2021 BATCH

I SEMESTER

S. No	Course Code	Course Name	Credits*			
			L	T	P	Total
1.	MCA11	Problem Solving Using 'C'	3	0	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			15	3	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	3	0	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	-	4	0	0	4
6.	MCA26 [#]	Java Script Frameworks	MCA16	0	1	2	3
Total				13	2	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					
6	MCAE--	Elective II					
Total							22

IV SEMESTER

S. No	Course Code	Course Name	Pre-requisite Course(s)	Credits*			
				L	T	P	Total
1	MCA41	Computer Networks	-	3	0	1	4
2	MCA42	Programming with Python	MCA11, MCA26	3	0	1	4
3	MCA43	Machine Learning		3	0	1	4
4	MCAE--	Elective III					
5	MCAE--	Elective IV					
6	MCAE--	Elective V					
7	MCAS1	Seminar I					1
Total							22

V SEMESTER

S. No	Course Code	Course Name	Pre-requisite Course(s)	Credits*			
				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					
5	MCAE--	Elective VII					
6	MCAE--	Elective VIII					
Total							20

SOFTCORE COURSES

S. No	Course Code	Course Name	Credits*			
			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	Credits*			
			L	T	P	Total
1	MCA61	Project Work				22
Total						22

#Semester End Examination will be conducted for Laboratory

* L: Lecture T: Tutorial P: Practical

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.
- 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)	Credits*			
				L	T	P	Total
1.	MCAE01	User Interface and User Experience Design		2	0	1	3
2.	MCAE02	Operations Research		2	1	0	3
3.	MCAE03	Hadoop Eco System		0	1	2	3
4.	MCAE04 [#]	Web Programming with PHP and AJAX	MCA26	0	1	2	3
5.	MCAE05 [#]	Computer Graphics and Animation		0	1	2	2
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	MCAE01	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	2	0	1	3
15.	MCAE15 [#]	Programming IoT	MCAE08	0	1	2	3
16.	MCAE16 [#]	ASP.Net with C#	MCA21, MCA26	0	1	2	3
17.	MCAE17	UNIX Systems Programming	MCA11/ MCA21, MCA14	2	0	1	3
18.	MCAE18	Deep Learning		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		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**

Operating Systems

Course Code: MCA31

Pre requisite: Nil

Course Coordinator: Chethan Venkatesh

Credits: 4:0:0

Contact Hours: 56L

UNIT I

Introduction to Operating Systems, System Structure

What operating systems do; Computer System Organization; Computer System Architecture; Operating System Operations; Computing Environments; Operating System Services; System Calls; Types of System Calls; System Programs; Operating System Structure; Virtual Machines; System boot.

Overview of Process

Process Concept; Process Scheduling; Operations on Processes; Inter – Process Communication; Multi – Threaded Programming: Overview: Multithreading Models.

UNIT II

Process Management

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Process Synchronization

Synchronization: The Critical Section Problem: Peterson's Solution; Semaphores; Classical Problems of Synchronization.

UNIT III

Deadlocks

Deadlocks: System model; Deadlock Characterization, Methods for handling deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from deadlock.

Memory Management

Memory Management Strategies: Background, Swapping; Contiguous Memory Allocation; Paging; Segmentation; Virtual Memory Management; Background; Demand Paging; Page Replacement; Allocation of Frames; Thrashing.

UNIT IV

File System, Implementation of File System

File System: File concepts; Access methods, Directory Structure; File System Mounting; Protection; Implementing File System: File System Structure; File System implementation; Directory Implementation; Allocation Methods; Free Space Management.

UNIT V

Secondary Storage Structures

Mass Storage Structure, Disk Structures; Disk Attachment; Disk Scheduling; Disk Management; Swap Space Management.

Protection

Protection: Goal of protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access matrix, Access Control, Revocation of Access Rights.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Principles, 8th Edition, Wiley – India.
Chapters: 1.1, 1.2, 1.3, 1.5, 1.12, 2.1, 2.3, 2.4, 2.5, 2.7, 2.8.1, 2.8.2, 2.8.6, 2.11, 3.1 to 3.4, 4.1, 4.2, 5.1 to 5.3, 5.5.1, 5.5.2, 5.5.3, 6.1 to 6.3, 6.5, 6.6, 7.1 to 7.7, 8.1 to 8.4, 8.6, 9.1, 9.2, 9.4 to 9.6.1, 10.1 to 10.4, 10.6, 11.1 to 11.5, 12.1 to 12.6, 14.1 to 14.7

Reference Books:

1. D M Dhamdhere: Operating Systems – A Concept Based Approach, 2nd Edition, Tata McGraw – Hill, 2002.
2. P C P Bhatt: Operating Systems, 2nd Edition, PHI, 2006.
3. Harvey M Deital: Operating Systems, 3rd Edition, Addison Wesley, 1990.

Course outcomes (COs):

1. Describe the elements and various functionalities of the operating system. (PO - 1,2,3)
2. Apply the techniques of process scheduling, process synchronization, and deadlock handling. (PO - 1,2,3)
3. Demonstrate various memory allocation strategies and virtual memory techniques. (PO - 1,2,3)
4. Explain the physical and logical structure of the storage media, illustrate various algorithms for storage management. (PO - 1,2,3)
5. Outline the mechanisms of protection and security of various system resources. (PO - 1,2,3)

Design and Analysis of Algorithms

Course Code: MCA32

Prerequisite: MCA24

Course Coordinator: Dr.S.Ajitha

Credits: 3:0:1

Contact Hours: 42L 28P

UNIT I

Introduction: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Basics of data Structures.

Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non recursive algorithms, Examples.

UNIT II

Brute Force: Selection Sort, String Matching, Exhaustive Search.

Divide-and-Conquer: Merge sort, Quick sort, Binary Search, Multiplication of large integers.

Principles of Parallel Algorithm Design: Preliminaries-Decomposition, tasks, and Dependency graphs, Granularity, Concurrency and Task-Interaction, Decomposition Techniques.

UNIT III

Decrease-and-Conquer: Insertion Sort, Depth First and Breadth First Search, Topological sorting, Algorithms for Generating Combinatorial Objects.

Transform-and-Conquer: Presorting, Heaps and Heap Sort.

UNIT IV

Space and Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching, Hashing.

Dynamic Programming: Warshall's and Floyd's Algorithms.

Greedy Technique: Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees.

UNIT V

Backtracking: n-queens problem, Hamiltonian Circuit Problem, Subset-Sum Problem, General Remarks.

Branch-and-Bound: Knapsack problem, Traveling Salesman Problem.

P, NP-Completeness and Approximation Algorithms: Introduction, P and NP Problems, NP-complete problems, Approximation algorithms for the traveling salesman problem, Approximation algorithms for Knapsack problem.

Laboratory

Programs that supplement the theory concepts are to be implemented.

Text Books:

1. Anany Levitin: Introduction to the Design and Analysis of Algorithms, 2nd Edition, Pearson Education, 2009.
Chapters 1.1-1.4, 2.1-2.4, 3.1, 3.2, 3.4, 4.1-4.3, 4.5, 5.1-5.4, 6.1, 6.4, 7.1-7.3, 8.2, 9.1-9.4, 11.3, 12.1-12.3
2. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar: Introduction to Parallel Computing, 2nd Edition, Pearson Education, 2003.
Chapters 3.1.1, 3.1.2, 3.2

References:

1. Horowitz E., Sahani S., Rajasekharan S.: Fundamentals of Computer Algorithms, 2nd Edition, Universities Press, 2007.
2. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 3rd Edition, PHI, 2010.

Course Outcomes (COs):

1. Derive the time complexity of algorithms in terms of asymptotic notations. (PO - 1,2,4,5,9)
2. Apply the brute force, divide and conquer and parallel algorithm approaches for designing algorithm and determining the order of growth. (PO - 1,2,3,4,5,9)
3. Implement the decrease and conquer and transform and conquer approach for designing and determining the order of growth of algorithms. (PO - 1,2,3,4,5,9)
4. Demonstrate the design techniques dynamic programming and greedy technique to solve problems and determine the time complexity. Describe the space and time tradeoffs for algorithms. (PO - 1,2,3,4,5,9)
5. Apply the branch and bound and backtracking approach for solving problem and describe the concepts of NP-hard problem. (PO - 1,2,3,4,5,9)

Software Engineering

Course Code: MCA33

Prerequisite: Nil

Course Coordinator: B.N.Nithya

Credits: 4:0:0

Contact Hours: 56L

UNIT I

Introduction: Professional software development, software engineering ethics, **Socio-technical systems:** Complex systems, System engineering, System procurement, System development, System operation, **Dependability and security:** Dependability properties, Availability and reliability, Safety, Security, **Software Process:** Software process model, Process activities, Coping with change, The rational unified process. **Product Life Cycle-** Product Life Cycle Stages, Product Life Cycle Case Study.

UNIT II

Requirements engineering: Functional and Non-functional requirements, the software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

System modeling: Context models, Interaction Models, Structural Models, Behavioral models, Model-driven engineering.

UNIT III

Software Design and Development, Architectural Design: Architectural design decisions, Architectural views, Architectural patterns, Application architectures, **Design and implementation:** Object-Oriented design using the UML, Design patterns, implementation issues, Open source development, **Agile software development:** Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, scaling agile methods.

UNIT IV

Software Evolution: Evolution processes, Program evolution dynamics, Software maintenance, Legacy system management, **Software Reuse:** The reuse landscape, Application frameworks, Software product lines, COTS product reuse, **Software Testing:** Development testing, Test-driven development, Release testing, User testing.

UNIT V

Software Management, Project Management: Risk Management, Managing people, Teamwork, **Project Planning:** Software pricing, Plan-driven development, Project scheduling, Agile planning, Estimation techniques, **Quality Management:** Software quality, Software standards, Software measurement and metrics. **Configuration Management:** Change management, version management, system building, release management.

- *Assignment – Documentation covering phases of Software Development Life Cycle for real world problem.*
- *Internet resources or any relevant books can be used for Product Life Cycle.*

Text Books:

1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education Publications, 2013.
Chapters: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 16, 22, 23, 24,25

Reference Books:

1. Roger. S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, McGraw-Hill, 2010.
2. Shari Lawrence Pfleeger, Joanne M. Atlee: Software Engineering Theory and Practice, 4th Edition, Pearson Education, 2009.
3. Ali Behforooz, Frederick J. Hudson: Software Engineering Fundamentals, 1st Indian Edition, Oxford University Press, 2006.

Course Outcomes (COs):

1. Exemplify the software engineering process, systems and security.
(PO - 1,2,4,6,8,10,11)
2. Explain the software engineering process by identifying the requirements and system modeling. (PO - 1,2,3,4,6,8,10,11,12)
3. Design, develop and implement software based on requirements.
(PO - 1,2,3,4,8,10,11,12)
4. Illustrate the evolution process, reuse and testing for giving a quality software to customer. (PO - 1,2,3,4,8,10,11,12)
5. Describe the software management, project management, and planning and configuration management. (PO - 1,3,4,8,11,12)

Programming in Java

Course Code: MCA34

Prerequisite: Nil

Course Coordinator: Dr.Manish Kumar

Credits: 3:0:1

Contact Hours:42L 28P

UNIT I

Introducing Classes: Introduction to Java, Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage, The finalize() Method, Exploring the String Class, Using Command-Line Arguments, Varargs, Scanner class.

Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

UNIT II

Packages and Interfaces: Packages, Access Protection, An Access Example Importing Packages, Interfaces, Default Interface methods.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions Using try and catch, multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

UNIT III

Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter-thread Communication, Suspending, Resuming, and Stopping Threads, Obtaining thread state, Using Multithreading

Enumeration and Autoboxing: Enumeration, Type Wrappers, Autoboxing.

Generics: What are Generics?, A Simple Generics Example, A Generics Class with two Type Parameters, The General Form of a Generic Class.

UNIT IV

The Collections Framework: Collections Overview, The Collection Interfaces, The List Interface, The ArrayList Class, The LinkedList Class.

Networking: Networking Basics, Client server communication using TCP and UDP.

Lambda Expressions: Introducing Lambda Expressions, Block Lambda Expression.

UNIT V

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, The event class, The Key event, Class Sources of Events, Event Listener Interfaces, Using the Delegation Event Model, Adapter Classes, Inner Classes.

JavaFX: Introducing JavaFX GUI programming, Exploring JavaFX controls.

Laboratory

Programs that supplement the theory concepts are to be implemented.

Text Books:

1. Herbert Schildt: The Complete Reference JAVA, 9th Edition, TATA McGraw HILL, 2014.
Chapters: 2, 6, 7, 8, 9, 10, 11, 12, 14, 15, 18, 22, 24, 34, 35

Reference Books:

1. T V Suresh Kumar, B Eshwara Reddy and P Raghavan: Programming with Java, Sanguine Technical Publishers, 2011.
2. Paul Deitel and Harvey Deitel: Java How to Program, 9th Edition, PHI, 2012.
3. Y.Daniel Liang : Introduction to JAVA Programming, 6th Edition, Pearson Education, 2006
4. Cay S Horstmann, Gary Cornell: Core Java 2 volume 1 and volume 2, 7th Edition, Pearson Education, 2005.

Course Outcomes (COs):

1. Develop programs using the OOP concepts and basic constructs in Java for a given problem. (PO-3)
2. Exemplify the usage of Generalization, Packages and Interfaces for OO Programming. (PO-3, 6)
3. Apply Java Exceptions, Multithreading programming, Enumerations, and Auto boxing to develop robust programs. (PO-3, 6)
4. Implement the concepts of Networking, Generics, and analyze the usage of collection framework and lambda expression. (PO-3, 6)
5. Develop User Interfaces using JAVAFX with Event Handling for Dynamic Applications. (PO-3, 6)

Operations Research

Course Code: MCAE02

Prerequisite: Nil

Course Coordinator: Chethan Venkatesh

Credits: 2:1:0

Contact Hours: 28L 28T

UNIT I

What is Operations Research? Operations Research Models, Solving the OR models, Queuing & Simulation models, Art of Modelling, Phases of OR Study
Modelling with Linear Programming: Two variable LP model, Graphical LP solution, Formulation of LP problems.

UNIT II

The Simplex Method: LP model in equation form, Transition from graphical to algebraic solution, The Simplex method.

Artificial starting solution - M Method, Two-Phase Method, Special cases in simplex method.

UNIT III

Duality and Dual Simplex Method: Definition of Dual Problem, Primal-Dual Relationships

Game theory: Introduction to Game Theory, the formulation of two persons, Zero sum games, solving simple Zero sum games, Games with mixed strategies.

UNIT IV

Transportation model and its Variants: Definition of the Transportation Model, Mathematical formation of Transportation problem, The Transportation Algorithm: Determination of the starting solution, Iterative computations of the Transportation Algorithm, The assignment model - The Hungarian Method.

UNIT V

PERT and CPM: Network representation, Critical Path (CPM) Computations, Construction of the Time Schedule, PERT calculations.

Text Books:

1. Operations Research: An Introduction, Hamdy A Taha, 8th Edition, Pearson Education, 2011.
Chapters: 1.1-1.6, 2.1, 2.2, 2.3.1, 2.3.3, 2.3.4 (Single-Period Production Model), 2.3.6, 3.1-3.5, 3.6.1, 4.1, 4.2, 4.3, 4.4.1, 5.1, 5.3.1, 5.3.2, 5.4.1, 6.1-6.3.2, 6.4.1, 6.4.2, 6.5.1-6.5.3, 6.5.5, 13.4 (Solution of Mixed Strategy Games using Graphical Method Only)

Reference Books:

1. S D Sharma: Operations Research, 15th Edition, Kedar Nath Ram Nath, Meerut, Delhi, 2005.
2. Fredrick S. Hiller, Gerald J Lieberman: Introduction to Operations Research, 9th Edition, McGraw Hill, India, 2008.

Course Outcomes (COs):

1. Formulate linear programming problems (LPP) and solve two-variable LPP graphically. (PO - 1,2,4)
2. Solve LP problems using simplex methods. (PO - 1,2,4)
3. Derive dual from a given primal problem and solve the LP problem using dual simplex method. Apply transportation and assignment model to obtain optimum solution. (PO - 1,2,4)
4. Construct network models for a given real world problem and determine the optimal solution. (PO - 1,2,4)
5. Apply PERT and CPM techniques for project management. Formulate and solve simple games to resolve competitive situations. (PO - 1,2,4)

Web Programming with PHP and AJAX

Course Code: MCAE04

Credits: 0:1:2

Prerequisite: MCA26

Contact Hours: 28T 56P

Course Coordinator:Dr.M.Mrunalini

Concepts to be covered in Tutorial:

1. Overview of PHP, WAMP, LAMP, Syntactic characteristics, Primitives, Variables and Operators, Working with HTML forms.
2. Controlling program flow, Arrays and Strings in PHP, Working with Dates and Times
3. Using functions and classes
4. PHP and MySQL
5. Working with Files in PHP
6. Working with Cookies, Sessions and Headers
7. Error Handling in PHP
8. Overview of AJAX and its applications, creating a simple AJAX example, XMLHttpRequest Object, Server side programming
9. Sending data to server using GET and POST
10. Handling multiple XMLHttpRequest Objects, Array of XMLHttpRequest Objects
11. Inner Functions, Downloading from another server using AJAX
12. XML in JavaScript, Accessing XML element, Accessing XML data directly

Laboratory

- Programs that supplement the tutorial concepts are to be implemented.
- Mini Project to be developed by the students.

Text Books:

1. Vikram Vaswani: PHP: A Beginner's Guide, Tata McGraw-Hill, 2009.
Chapters: 1, 2, 3, 4, 5, 6, 7, 9, 10
2. Steven Holzner: Ajax: A Beginner's Guide, Tata McGraw-Hill, 2009.
Chapters: 1, 3, 4, 6

Reference Books:

1. Ivan Bayross, Sharanam Shah: PHP 5.1 for Professionals, 3rd Edition, Shroff Publishers and Distributors Pvt. Ltd, 2007.
2. B M Harwani: Developing Web Applications in PHP and Ajax, Tata McGraw-Hill, 2010.

Course Outcomes (COs):

1. Design and develop PHP based web applications. (PO - 1,2,3,5,9)
2. Apply the concept of MySQL connectivity, files, cookies, sessions, and error handling in web based applications. (PO - 1,2,3,5,9)
3. Create AJAX based web applications. (PO - 1,2,3,5,9)

NoSQL Databases

Course Code: MCAE07

Prerequisites: MCA23

Course Coordinator: Dr.Madhu Bhan

Credits: 0:1:2

Contact Hours: 28T, 56P

Concepts to be covered in Tutorial

- Introduction to NoSQL
 - NoSQL Databases and their Benefits
- MongoDB Introduction
 - Introduction to MongoDB and its Features
 - Database, Collection and Documents
 - Data Types in MongoDB
 - Installation
 - The Mongo shell
- CRUD Operations
 - Create Operations
 - Read Operations
 - Update Operations
 - Delete Operations
 - Bulk Write
- Aggregation
 - Aggregation Pipeline
 - Map-Reduce
 - Single Purpose Aggregation Operations
- Text Search
 - Text Indexes
 - Text Search Operators
 - Text Search in the Aggregation Pipeline
- Geospatial Queries
 - Find Restaurants with Geospatial Queries
 - GeoJSON Objects
- Indexes
 - Single Field Indexes
 - Compound Indexes
 - Storage
- Storage Engines
 - Journaling
 - GridFS
- Replication
 - Replica Set Members
 - Replica Set Deployment Architectures
 - Replica Set High Availability

- Replica Set Read and Write Semantics
- Sharding
 - Sharded Cluster Components
 - Sharding Strategy
 - Data Partitioning with Chunks
 - Sharded Cluster Balancer
- Web Application with MongoDB using PHP/Python/PyMongo
 - Connecting PHP/Python/PyMongo with MongoDB
 - CRUD Operations
 - Aggregate functions with PHP/Python//PyMongo

Laboratory

- Programs supplementing the concepts covered in tutorial.

References

1. Kristina Chodorow: MongoDB: The Definitive Guide: Powerful and Scalable Data Storage, 2nd Edition, O'Reilly, 2013.
2. <https://docs.mongodb.com/>
3. https://www.tutorialspoint.com/mongodb/mongodb_tutorial.pdf

Course Outcomes (COs):

1. Design and Develop queries for CRUD operations in MongoDB. (PO-1,2,3,4,5,7,11)
2. Design and Develop queries using Aggregation Framework and Pipeline to access MongoDB. (PO-1,2,3,4,5,7,11)
3. Develop PHP/Python//PyMongo programs for CRUD operations and Aggregation functions. (PO – 1,2,3,4,5,7,8,9,10,11,12)

Digital Forensics

Course Code: MCAE11

Prerequisite: Nil

Course Coordinator: Chethan Venkatesh

Credits: 2:0:2

Contact Hours: 28L 56P

UNIT I

Understanding Cyber Crimes, Indian IT Act 2008, and its amendments, Computer Forensic and Investigations as a Profession: Understanding Computer Forensics.

Understanding Computer Investigations: Preparing a Computer Investigation, Taking a Systematic Approach, Procedures for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software.

UNIT II

Working with Windows and DOS Systems: Understanding File Systems, Exploring Microsoft File Structures, Examining NTFS Disks, Understanding Whole Disk Encryption, Understanding the Windows Registry, Understanding Microsoft Startup Tasks, Understanding MS-DOS Startup Tasks, Understanding Virtual Machines.

Macintosh and Linux Boot Processes and File Systems: Understanding the Macintosh File Structure and Boot Process, Examining UNIX and Linux Disk Structures and Boot Processes, Understanding Other Disk Structures.

UNIT III

Current Computer Forensics Tools: Evaluating Computer Forensic Tool Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software.

Data Acquisition: Understanding Storage Formats for Digital Evidence, Determining the best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisitions, Performing RAID Data Acquisitions, Using Remote Network Acquisition Tools, and Using Other Forensic Acquisition Tools.

UNIT IV

Computer Forensics Analysis and Validation: Determining What Data to Collect and Analyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisitions.

Recovering Graphics Files: Recognizing a Graphics File, Understanding Data Compression, Locating and Recovering Graphics Files, Identifying Unknown File Formats, Understanding Copyright Issues with Graphics.

UNIT V

Network Forensics: Network Forensic Overview, Performing Live Acquisitions, Developing Standard Procedures for Network Forensics, Using Network Tools. **E-mail Investigations:** Exploring the Role of E-mail in Investigations, Exploring the Roles of the Client and Server in E-mail, Investigating E-mail Crimes and Violations, Understanding E-mail Servers, Using Specialized E-mail Forensics Tools.

**Assignment Based on Case Study*

Laboratory

Lab exercises using forensic software and case study.

Textbooks:

1. Nelson, Phillips, Frank, Enfinger and Steuart: Computer Forensics and Investigations, Cengage Learning, 2008.
Chapters: 1, 2, 4, 6, 7, 8, 9, 10, 11, 12

Reference Books:

1. Marjie T. Britz: Computer Forensics and Cyber Crime - An Introduction, 2nd Edition, Pearson Education, 2012.
2. Pawan Duggal: Cyber Law- An exhaustive section wise Commentary on The Information Act along with Rules, Regulations, Policies, Notifications etc., Universal Law Publishing Co. Pvt. Ltd., 2014.
3. Harish Chander: Cyber Laws and IT Protection, PHI, 2012.

Course Outcomes (COs):

1. Recall the Indian IT Act 2008, its amendments and describe various types of computer crime and its investigation techniques. (PO - 6,10)
2. Describe the file system and process handling concept of MS-DOS, Windows, and Macintosh and Linux operating system. (PO – 3,5,10)
3. Analyze and validate evidences using forensic tools. (PO – 4,5,6,9,10)
4. Extract, analyze hidden information from graphics, images and other files using forensic tools. (PO – 4,5,9,10)
5. Apply network forensic tools for network forensic, email investigation and live data forensic analysis. (PO – 4,5,9,10)

IV Semester

Computer Networks

Course Code: MCA41

Prerequisite: Nil

Course Coordinator: Dr.S.Ajitha

Credits: 3:0:1

Contact Hours: 42L 28P

UNIT I

Computer Networks and the Internet: What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models.

UNIT II

Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications.

UNIT III

Transport Layer: Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP.

UNIT IV

Transport Layer: Principles of Congestion Control, TCP Congestion Control.
The Network Layer: Introduction, Virtual Circuit and Datagram Networks, What's Inside a Router? The Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing Algorithms.

UNIT V

The Network Layer: Routing in the Internet Broadcast and Multicast Routing.
The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Correction Techniques, Multiple Access Protocols, Link-Layer Addressing.

Laboratory:

Exercises to supplement the concepts using existing tools

Text Books:

1. James F. Kurose, Keith W. Ross: Computer Networking: A Top-Down Approach, 5th Edition, Addison-Wesley, 2012.
Chapters: 1, 2.1 - 2.6, 3, 4.1- 4.7, 5.1 - 5.4

Reference Books:

1. Behrouz A. Forouzan: Data Communications and Networking, 4th Edition, Tata McGraw-Hill, 2006.
2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks- Fundamental Concepts and Key architectures, 3rd Edition, Tata McGraw-Hill, 2004.
3. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
4. Larry L. Peterson and Bruce S. David: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
5. Wayne Tomasi: Introduction to Data Communications and Networking, Pearson Education, 2005.
6. Nader F. Mir: Computer and Communication Networks, Pearson Education, 2007.

Course Outcomes (COs):

1. Describe basic terminologies used for computer networking. (PO - 1,2,3,5)
2. Demonstrate application layer protocols used for process to Process Communication and illustrate using packet tracer and wire shark. (PO - 1,2,3,5,9)
3. Illustrate transport layer protocols using wire shark. (PO - 1,2,3,5,9)
4. Elucidate network layer protocols using packet tracer. (PO - 1,2,3,5,9)
5. Explain link layer functionalities. (PO - 1,2,3,5)

Programming with Python

Course Code: MCA42

Prerequisites: MCA16, MCA21

Course Coordinator: Chethan Venkatesh

Credits: 3:0:1

Contact Hours: 42L 28P

UNIT I

Introduction to Python

Python Basics

Data Types, Operators, Input/Output Statements, Creating Python Programs.

Python Flow Control statements

Decision making statements, Indentation, Conditionals, loops, break, continue, and pass statements.

Core Data Structures

Strings, Lists, Tuples, and Dictionaries.

UNIT II

Python Functions

Defining functions, DOC strings, Function parameters: default, keyword required and variable length arguments, key-word only parameters, local and global variables, pass by reference versus value, Anonymous functions, Recursion.

Functional Programming

Mapping, Filtering and Reduction, Lambda Functions, List Comprehensions.

UNIT III

Object Oriented Programming

Definition and defining a class, Constructor, Destructor, self and del keywords, Access to Attributes and Methods, getattr and setattr attributes, Data Attributes and Class Attributes, Data Hiding, Inheritance, Static Members.

Regular Expressions

Defining Regular Expressions and String Processing

UNIT IV

File I/O

File object attributes, Read and Write into the file, Rename and Delete a File.

Exceptions Handling

Handling Exceptions, Built-in Exceptions and User defined Exceptions.

GUI Programming

Introduction to Python GUI Programming, Tkinter Programming, Tkinter widgets, Events and Bindings.

UNIT V

Working with Django

Rendering Templates into HTML and Other Formats, Understanding Models, Views, and Templates, Separating the Layers (MVC) - Models, Views, Templates, Overall Django Architecture, Defining and Using Models, Using Models, Templates and Form Processing, Setting up the Database, Using a Database Server, Using SQLite, Creating the Tables.

Laboratory:

Programs that supplement the theory concepts are to be implemented.

Reference Books:

1. Timothy A. Budd: Exploring Python, Tata McGraw-Hill, 2011.
2. Ascher, Lutz: Learning Python, 4th Edition, O'Reilly, 2009.
3. Jeff Forcier, Paul Bissex, Wesley Chun: Python Web Development with Django, Addison-Wesley (e-book), 2008.
4. Wesley J Chun: Core Python Applications Programming, Pearson Education, 3rd Edition, 2013.

Course Outcomes (COs):

1. Apply the basic and core data structures of Python programming. (PO – 1,2,3,5,9)
2. Develop modular programs using functions. (PO – 1,2,3,5,9)
3. Implement object oriented concepts and regular expressions in Python. (PO – 1,2,3,5,9)
4. Create graphical user interface using Tkinter and implement files and exception handling. (PO – 1,2,3,5,9)
5. Build web applications using Django framework. (PO – 1,2,3,5,9)

Machine Learning

Course Code: MCA43

Credits: 3:0:1

Prerequisites: MCA12, MCA21

Contact Hours: 42L 28P

Course Coordinator: Sailaja Kumar

UNIT I

Introduction: Basic Definitions, Types of Learning, Hypothesis Space and Inductive Bias, Evaluation, Cross-Validation.

UNIT II

Linear Regression: Introduction to Decision Trees, Learning Decision Trees, Over-Fitting.

UNIT III

Support Vector Machine, Kernel Function and Kernel SVM.

UNIT IV

Neural Network: Perceptron, Multilayer Network, Back Propagation; Computational Learning Theory, PAC Learning Model, Sample complexity, VC Dimension, Ensemble learning: Boosting and Bagging.

UNIT V

Clustering: K-Means, Adaptive Hierarchical Clustering, Gaussian Mixture Model.

Laboratory:

Programs that supplement the theory concepts are to be implemented.

Reference Books:

1. Tom Mitchell, Machine Learning, 1st Edition, McGraw- Hill, 1997.
2. Ethem Alpaydin, Introduction to Machine Learning, 2nd Edition, The MIT Press Cambridge, Massachusetts London, England, 2010
3. Sebastian Raschka, Python Machine learning, Packt Publishing Ltd., 2015

Course Outcomes (COs):

1. Distinguish between, supervised, unsupervised and semi-supervised learning. (PO – 1,2,4)
2. Apply the supervised machine learning algorithms for any given problem. (PO-1,4,6)
3. Analyze the usage of SVMs in solving problems (PO-1,4,6)
4. Demonstrate the dimensionality reduction techniques (PO-1,4,6)
5. Design applications that uses the appropriate graph models of machine learning. (PO-1,4,6)

Secure Coding in C and C++

Subject Code: MCAE06

Credits: 3:0:1

Prerequisite: MCA11, MCA21

Contact Hours: 42L 28P

Course Coordinator: Dr.Manish Kumar

UNIT I

Running with Scissors, Gauging the Threat, Security Concepts, Development Platforms, **Strings**, Character Strings, Common String Manipulation Errors, String Vulnerabilities and Exploits, Mitigation Strategies for Strings, String-Handling Functions, Runtime Protection Strategies, Notable Vulnerabilities.

UNIT II

Pointer Subterfuge, Data Locations, Function Pointers, Object Pointers, Modifying the Instruction Pointer, Global Offset Table, The .ctors Section, Virtual Pointers, The atexit() and on_exit() Functions, The longjmp() Function, Exception Handling, Mitigation Strategies, **Dynamic Memory Management**, C Memory Management, Common C Memory Management Errors, C++ Dynamic Memory Management, Common C++ Memory Management Errors.

UNIT III

Memory Managers, Doug Lea's Memory Allocator, Double-Free Vulnerabilities Mitigation Strategies, Notable Vulnerabilities **Integer Security**, Introduction to Integer Security, Integer Data Types, Integer Conversions, Integer Operations, Integer Vulnerabilities, Mitigation Strategies.

UNIT IV

Formatted Output, Variadic Functions, Formatted Output Functions, Exploiting Formatted Output Functions, Stack Randomization, Mitigation Strategies, Notable Vulnerabilities, **Concurrency**, Multithreading, Parallelism, Performance Goals, Common Errors, Mitigation Strategies, Mitigation Pitfalls, Notable Vulnerabilities.

UNIT V

File I/O, File I/O Basics, File I/O Interfaces, Access Control, File Identification, Race Conditions, Mitigation Strategies, **Recommended Practices**, The Security Development Lifecycle, Security Training, Requirements Design, Implementation, Verification.

Text Books:

1. Robert C. Seacord: Secure Coding in C and C++, 2nd Edition, Pearson, 2013. (Chapter 1,2,3,4,5,6,7,8,9)

References:

1. SEI CERT Coding Standards

Course Outcomes (COs):

1. Identifying the vulnerability associated with Sting Handling and Mitigation strategies. (PO3)
2. Describe the threats associated with Runtime Memory Management and Pointers. (PO3)
3. Apply the mitigation techniques for vulnerable memory management and data type's conversion. (PO3)
4. Identify the vulnerability associated with Formatted Output and Concurrency. (PO3)
5. Describe the vulnerability mitigation techniques for File I/O and recommended practices for security development lifecycle. (PO3)

Mobile Application Development

Course Code: MCAE08

Prerequisite: Nil

Course Coordinator: Dr.Manish Kumar

Credits: 0:1:2

Contact Hours: 28T 56P

Topics to e 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 SDK.
- Mini Project

Text Books:

1. Reto Meier: Professional Android 4 Application Development. Wiley India Edition, 2012.

Reference Books:

1. Jerome (J.F.) Di Marzio: Android A Programmer's Guide, Tata McGraw-Hill, 2010.
2. B.M. Harwani: Android Programming, Pearson, 2013.
3. Jason Ostrander: Android UI Fundamentals Develop and Design, Pearson, 2014.
4. John Horton: Android Programming for Beginners, Packt publishing, 2015.
5. **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. Handle sensors and location based services for real world Apps development. (PO - 1,2,3,5,7,10,11)
4. Develop the Android Applications Using Databases and Background Services. (PO - 1,2,3,5,7,10,11,12)

Web Component Development with J2EE

Course Code: MCAE09

Credits: 0:1:2

Prerequisites: MCAE01

Contact Hours: 28T 56P

Course Coordinator: Dr.S.Jagannatha

Course Contents:

1. JDBC and Embedded SQL
2. Introduction to Servlets, Advantages of Servlets over CGI,
3. The Servlets Life Cycle, Servlet API, Handling HTTP GET and POST Request.
4. Servlet Context, Servlet Config, Request Dispatcher, Send Redirect
5. Cookies, Session Tracking, Filter API
6. Single Thread Model, Multi-tier Applications Using Database Connectivity
7. Introduction to Java Server Pages(JSP), Advantages of JSP,
8. Components of a JSP: Expressions, Scriptlets, Comments, Declaratives, Directives, (Page, Include, Taglib) Implicit Objects, JSTL
9. JSP Standard Actions (usebean, setproperty, getproperty, param, plugin, and fallback)
10. Introduction to Java Beans, The Java Beans API – Introspector, property Descriptor, Event Descriptor, Method Descriptor, A Bean Example, JSP with Java Beans
11. Introduction to Springs, Spring MVC architecture, Configuring Spring with Eclipse, Crating first Spring Application
12. Understanding annotations - @Controller, @RequestMapping, @PathVariable, @RequestParam, @ModelAttribute
13. Introduction to Hibernate, Configuring Hibernate with Eclipse, creating first model using Hibernate, creating tables and records using Hibernate annotations.
14. Sample application development using spring and hibernate.

Laboratory:

- Programs that supplement the tutorial concepts are to be implemented.
- Mini Project to be developed by the students.

Text Books:

1. Jim Keogh: The complete Refernce J2EE, 1stEdition, Tata McGraw Hill, 2002.
2. Mahesh P. Matha JSP and Servlets, 1stEdition, PHI, 2013.
3. Sharanam Shah Spring 3 with Hibernate 4 Project For Professionals .
4. Ranga Karanam Mastering Spring 5.0 Paperback – 28 Jun 2017.

Reference Books:

1. Web Technologies Black Book, Kogent Learning solutions Inc sol., Dreamtech Press, 2012.
2. James McGovern, Rahim Adata, Yakov Fain, Jason Gordon, Ethan Henry, Walter Hurst, Ashish Jain, Mark Little, VaidyanathanNagarajan, Harshad Oak, Lee Anne Phillips: Java 2 Enterprise Edition 1.4 (J2EE 1.4) Bible, Wiley, 2003.
3. Bond, Law, Longshaw, Haywood, Roxburgh: Teach Yourself J2EE (J2EE 1.4), 2nd Edition, Pearson Education, 2005.

Course Outcomes (COs):

1. Develop JDBC, Server side components using Java servlet with the interaction of different tiers. (PO- 1,2,3,5,7,9,10,11,12)
2. Apply the concepts JSP, Beans and Java frameworks for Dynamic Web Applications.
(PO-1,2,3,5,7,9,10,11,12)
3. Create Simple web-based application for a real world problem using the concepts of servlet, Java Beans, JSP and frameworks with the interaction of multi-tier architecture. (PO-1,2,3,5,7,9,10,11,12)

Programming with C#.Net

Course Code: MCAE10

Credits: 2:0:2

Prerequisite: MCA21

Contact Hours: 28L 56P

Course Coordinator: Sailaja Kumar

UNIT I

Introduction to .NET Framework: The.Net Strategy, The Origins of .Net technology, The .Net Framework, The Common Language Runtime, Framework Base Classes, user and Program Interfaces, Visual Studio .Net, .Net Languages, Benefits of the .Net Approach.

Overview of C#: Introduction, A Simple C# Program, Namespaces, Adding Comments.

C# Language Fundamentals: Overview of C#, Literals, Variables and Data Types, Operators and Expressions, Decision Making and Branching, Decision Making and Looping.

UNIT II

Managing Console I/O Operations: Introduction, The Console Class, Console Input, Console Output, Formatted Output, Numeric Formatting, Standard Numeric format, Custom Numeric Format.

Arrays and Strings: Arrays, Multidimensional Arrays, Jagged Arrays, Assigning Array References, Using the Length Property, Implicitly Typed Arrays, For each Loop, Strings.

Introducing Classes and Objects: Class Fundamentals, Reference Variables and Assignment, Methods, Constructors, Garbage Collection and Destructors, This Keyword.

UNIT III

A Closure Look at Methods and Classes: Controlling Access to Class Members, pass references to Methods, Use ref and out Parameters, use a variable Number of Arguments, return Objects, Object Initializers, Optional Arguments, Named Arguments, The Main() Method, Understanding Static, Static Classes

Indexer and Properties: Indexers, Properties.

Inheritance: Basics, Member Access and Inheritance, Constructors and Inheritance, Inheritance and Name hiding, Creating a Multilevel Hierarchy, Base Class References and Derived Objects, Virtual Methods and Overriding, Using Abstract Classes, Using Sealed to Prevent Inheritance, the Object Class.

UNIT IV

Interfaces, Structures and Enumerations: Interfaces, Structures, Enumerations

Namespaces: Declaring a Namespace, Resolving name conflict using namespace, using, A Second Form of using, Nested Namespaces, Global Namespace, Using the::Namespace Alias Qualifier.

Exception Handling: The System Exception Class, Exception Handling Fundamentals, Consequences of an Uncaught Exception, Using Multiple Catch Clauses, Catching All Exceptions, Nested Try Blocks, Throwing an Exception, Using Finally.

UNIT V

LINQ: LINQ Fundamentals, Filter Values with where, Sort Results with Order-by, Select and Nested From Clauses, Group Results With Group, Use into to Create a Continuation, Use let to Create a Variable in a Query, Join Two Sequences with Join, Anonymous Types, Create a Group Join.

Delegates, Events and Lambda Expressions: Delegates, Anonymous Functions, Anonymous Methods, Lambda Expressions, Events.

Laboratory:

Programs supplementing the theory concepts.

Reference Books:

1. Joseph Albahari & Ben Albahari: C# 6.0 in a NutShell A Definitive Reference, O'Reilly, 6th Edition, 2016.
2. Herbert Schildt: The Complete Reference C# 4.0, Tata McGraw Hill, 2010.
3. E. Balagurusamy: Programming in C#, Tata McGraw Hill, 3rd Edition, 2011.

Course Outcomes (COs):

1. Demonstrate the basic programming constructs of C# on .Net framework. (PO-1,2,3,5,9)
2. Apply object oriented concepts to develop dynamic interactive C# applications. (PO-1,2,3,5,9)
3. Demonstrate Indexers and Properties to manage access to class' instance data. (PO-1,2,3,5,9)
4. Apply C# exception handling model to develop robust programs. (PO-1,2,3,5,9)
5. Implement delegate and events for method encapsulation and queries for processing in-memory data using LINQ. (PO-1,2,3,5,9)

Software Testing

Course Code: MCAE14

Prerequisite: MCA33

Course Coordinator: B.N.Nithya

Credits: 3:0:1

Contact Hours: 42L 28P

UNIT I

Introduction to Testing: Introduction and Fundamentals of Testing, Quality Assurance and Quality Control, Testing Objectives, Software Testing Life Cycle (STLC), Test Planning, Test – Case Design Technique, Equivalence Partitioning and Boundary Values,

Types of Testing: White Box testing: What is White Box Testing? Static Testing, Structural Testing, Challenges in White Box testing.

Black Box Testing: What is Black Box Testing? Why Black Box Testing? When to do Black Box Testing?, How to do Black Box Testing?

Defect Management: Bugzilla Defect Tracking Tools.

UNIT II

Software Test Automation: Fundamentals of Test Automation, Design and Architecture for Automation, Robotic Process Automation: An Introduction, Challenges in Automation.

Introduction to Selenium Components of Selenium, Advantages and Disadvantages of Selenium, Installation of Selenium IDE & Firebug Add-on, Writing the Test Cases, Selenium Commands, Assert, Verify, Locators, Enhancements, Variables, Echo, Alert, and Popup.

UNIT III

Selenium –Web Driver: Introduction to WebDriver , Comparison with Selenium RC, Architecture, Installation of Selenium WebDriver, Creating the Scripts in WebDriver, WebDriver Commands: Browser Commands, getUrl(), getTitle(), getPageSource(),close(),Quit(), Navigation Commands, backward(), forward(), to(), refresh(), WebElements Commands, Isselected(), IsEnabled(), getAttribute(), getText(), notify(), sendKeys(), submit(), wait().

UNIT IV

Performance Testing: Methodology for Performance Testing, Tools for Performance Testing, Process for Performance Testing.

Web Element Locator, Xpath, id, LinkText, CSS selector, ClassName, TagNameFindElement and FindElements Command, CheckBox and Radio button Operation, DropDown and Multiple Select Operations.

UNIT V

Handle Alert in WebDriver: dismiss(),accept(),getText(), sendKey(),Popup window handling in Web Drivers, getWindowHandle(), wait commands in Web Drivers, Mouse Event using Action commands, Handling Multiple Windows, and IFrames, Running Test in Invisible Mode.

Text Books:

1. Rex Black: Advanced Software Testing – Vol. 1, Shroff Publishers, 2011.
2. Srinivasan DesikanGopaldaswamy: Software Testing Principles and Practices, 5th Edition, Pearson Education, 2007.
3. Paul C. Jorgensen: Software Testing A Craftman’s Approach, 3rd Edition, Auernac Publications, 2008
4. David Burns: Selenium 2 Testing Tools: Beginner’s Guide, PACKTPUBLISHING, 2012.
5. Robotic Process Automation from <http://www.umsl.edu/~lacitym/OUWP1601.pdf>

Reference Books:

1. Rex Black: Advanced Software Testing – Vol. 2, Shroff Publishers, 2011.
2. Gundecha Unmesh: Selenium Testing Tools Cook Book, PACKT PUBLISHING, 2012.

Course Outcomes (COs):

1. Illustrate the concept of process of testing using different types of test cases and testing techniques. (PO-1,5,7,8,9,10,12)
2. Describe the test planning, management, and execution and design check list and Templates using the testing tool selenium IDE. (PO-1,5,7,8,10,11,12)
3. Implement the Test Automation using the testing tool Selenium IDE. (PO-1,3,5,7,8,9,10,11,12)
4. Analyze the different perspective of test metrics and measurements. (PO-1,3,5,7,8,9,10,11,12)
5. Demonstrate the usage of bug tracking tools like Bugzilla and Mantiz. (PO-1,3,7,8,9,10,11,12)

UNIX Systems Programming

Course Code: MCAE17

Prerequisite: MCA11/MCA21, MCA14

Course Coordinator: Dr. Yogish H K

Credits: 2:0:1

Contact Hours:28L 28P

UNIT I

Introduction

UNIX and ANSI Standards: The ANSI C Standard, The POSIX Standards, POSIX feature test macros, Limits Checking at Compile Time and at Run Time. The POSIX APIs, API Common Characteristics.

UNIX Files

File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Hard and Symbolic Links.

UNIT II

UNIX File APIs

General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.

UNIT III

UNIX Processes

The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions.

Process Control

Introduction, Process Identifiers, fork, vfork, Zombie Process, wait, waitpid, Race Conditions, exec Functions.

UNIT IV

Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp, tcsetpgrp, and tcgetsid Functions, Job Control.

Signals

Introduction, The UNIX Kernel Support for Signals, signal (), signal sets, Signal Mask, sigaction, The sigsetjmp and siglongjmp Functions, Kill, Alarm.

UNIT V

Daemon Processes

Introduction, Daemon Characteristics, daemon Coding Rules, Error Logging,

Interprocess Communication

Introduction, Pipes, popen, pclose Functions; Coprocesses; FIFOs; Stream Pipes, Client-Server Connection Functions.

Laboratory:

Programs that supplement the theory concepts are to be implemented.

Text Books:

1. Terrence Chan: UNIX System Programming Using C++, PHI, 1999.
2. Chapters 1, 5, 6, 7, 8, 9
3. W. Richard Stevens, Stephen A. Rago: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005.
4. Chapters 7, 8, 9, 13, 15

Reference Books:

2. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.
3. Maurice .J. Bach: The Design of the UNIX Operating System, Pearson Education, 1987.
4. Uresh Vahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

Course outcomes (COs):

1. Describe UNIX file system, UNIX/POSIX standards and POSIX API's. (PO1, PO2, PO4, PO5)
2. Implement API's required to perform various file operations on different file types. (PO1, PO2, PO3, PO5, PO9)
3. Implement API's required to create, run and control processes. (PO1, PO2, PO3, PO5, PO9)
4. Describe API's required for process relationships and signals. (PO1, PO2, PO3, PO5, PO9)
5. Describe various methods for handling daemon process and inter-process Communication. (PO1, PO2, PO4, PO5)

Self-Study Course

Course Code: MCASS1

Credits: 0:0:0:2

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