

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(An Autonomous Institute)



Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, UTTAR PRADESH LUCKNOW



Evaluation Scheme & Syllabus

For

Master of Computer Applications (MCA)

Second Year

(Effective from the Session: 2026-27)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)

MCA
Evaluation Scheme
SEMESTER III

Sl. No.	Subject Codes	Subject Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	CMCA0301	Cloud Computing	Mandatory	3	1	0	30	20	50		100		150	4
2	CMCA0302	Computer Networks	Mandatory	3	1	0	30	20	50		100		150	4
3	CMCA0303	Software Engineering	Mandatory	3	0	0	30	20	50		100		150	3
4		Departmental Elective II	Departmental Elective	3	0	0	30	20	50		100		150	3
5	CMCA0355	Web Technology Lab	Mandatory	0	0	6				50		100	150	3
6	CMCA0351	Cloud Computing Lab	Mandatory	0	0	2				50		50	100	1
7	CMCA0352	Computer Networks Lab	Mandatory	0	0	2				50		50	100	1
8		Departmental Elective II Lab	Departmental Elective	0	0	2				25		25	50	1
9	CMCA0356	Competitive Programming Lab	Mandatory	0	0	2				50		50	100	1
10	CMCA0357	Professional Personality Development Lab	Mandatory	0	0	4				50		50	100	2
11	CMCA0359	Software Engineering in Mini Project Lab	Mandatory	0	0	4				50		50	100	2
		TOTAL		12	2	22	120	80	200	325	400	375	1300	25

List of MOOCs Based Recommended Courses for Second Year (Semester-III) MCA Students

S. No.	Subject Code	Course Name	University/Industry Partner Name	No of Hours
1	CMC0040	HTML5 - The Language	IIHT	13h 17m
2	CMC0041	Introduction to Cloud Computing	Infosys Wingspan (Infosys Springboard)	5h 44m

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam.
CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit,
MOOCs: Massive Open Online Courses.

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List of Department Elective (if any): -

S. No.	Subject Codes	Subject Name	Type of Subject	Bucket Name	Applicable Branch	Semester
1	CMCA0311	Advance Concepts of Analytics	Departmental Elective-II	Data Analytics	MCA	III
2	CMCA0312	Advance Concepts of Optimization	Departmental Elective-II	Data Optimization	MCA	III
3	CMCA0313	Advance Software Testing	Departmental Elective-II	Testing	MCA	III
4	CMCA0314	CRM Advance Administration	Departmental Elective-II	CRM	MCA	III
5	CMCA0311P	Advance Concepts of Analytics Lab	Departmental Elective -II Lab	Data Analytics	MCA	III
6	CMCA0312P	Advance Concepts of Optimization Lab	Departmental Elective -II Lab	Data Optimization	MCA	III
7	CMCA0313P	Advance Software Testing Lab	Departmental Elective -II Lab	Testing	MCA	III
8	CMCA0314P	CRM Advance Administration Lab	Departmental Elective -II Lab	CRM	MCA	III

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MCA

Evaluation Scheme

SEMESTER IV

Sl. No.	Subject Codes	Subject Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	CMCA0458	Industry Seminar	Mandatory	0	0	2				50		50	100	1
2	CMCA0459	Internship	Mandatory	0	0	32				250		350	600	16
	GRAND TOTAL									300		400	700	17

*** List of MOOCs Based Recommended Courses for Second Year (Semester-IV) MCA Students**

S. No.	Subject Code	Course Name	University /Industry Partner Name	No. of Hours
1	CMC0066	Project Management with Agile	Infosys Wingspan (Infosys Springboard)	14h 58m

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam.
CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit,
MOOCs: Massive Open Online Courses.

Course Code: CMCA0301			Cloud Computing				L	T	P	C
Course Offered in: MCA 2nd Year (3rd Semester)							3	1	0	4
Pre-requisite: Adequate knowledge of Basics of Computers along with an online course “Google Cloud Computing Foundation Course, IIT Kharagpur, NPTEL										
Course Objectives:										
To provide comprehensive knowledge of Cloud Computing concepts, technologies, and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications, and implementations										
Course Outcome: After completion of the course, the student will be able to							Bloom’s Knowledge Level (KL)			
CO1	Analyze the fundamentals of cloud computing and computing techniques.						K1			
CO2	Describe the concepts of virtualization and its role in cloud service delivery.						K3			
CO3	Discuss various services and architecture of cloud.						K4			
CO4	Analyze the management of various cloud resources like instances, storage and network.						K4			
CO5	Analyze the importance of cloud security solutions with monitoring and auditing.						K4			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	3	3	3	2	2	3	3		
CO2	3	3	2	3	3	2	3	3		
CO3	2	3	3	3	3	2	2	3		
CO4	3	3	3	3	3	2	3	3		
CO5	3	3	3	3	3	3	3	3		
Course Contents / Syllabus										
Unit-1		Cloud Computing and its infrastructure						10 hours		
Introduction: Introduction to Cloud Computing, Definition of Cloud, Evolution of Cloud Computing, Underlying Principles of Parallel and Distributed Computing, Cloud Characteristics, Scalability & Elasticity in Cloud, On-demand Provisioning, Multitenancy, Cloud economics.										
Unit-2		Cloud Virtualization Basics						14 hours		
Basics and need of Virtualization: Basics and need of Virtualization, Types of Virtualizations, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory – I/O Devices, VMM and its types, Virtual Machines, Virtualization tools, Virtualization Support and Disaster Recovery, Resource Provisioning and Resource, Provisioning Methods										
Unit-3		Service Models and Reference Architecture						14 hours		
Service Oriented Architecture: Service Oriented Architecture, Systems of Systems, Web Services, REST, Publish Subscribe Model, Deployment Model, Public, Private and Hybrid Clouds, IaaS, PaaS, SaaS, Layered Cloud Architecture Design, Challenges and NIST Cloud Computing Reference Architecture, Benefits of CCRA, Architecture Overview – The conceptual Reference Model, Cloud Consumer, Cloud provider, Cloud Auditor, Cloud carrier, Scope of control between Provider and Consumer, IBM’s Cloud Computing Reference Architecture (CCRA 2.0).										

Unit-4	Resource Management	10 hours
Storage Virtualization: Managed and Unmanaged resources in cloud, Instance Management, EC2, Azure Virtual Machine, Google Compute Engine. Storage Services: Block Storage, Elastic File Storage, Object Storage, S3, RDS, Dynamo DB, Backup, disaster recovery and storage migration. Network Services: VPC, Subnets, Routing, Security Groups, DNS, Direct Connect, VPC Endpoints. .		
Unit-5	Cloud Security, Monitoring and Auditing	12 hours
Cloud Security, Monitoring and Auditing: Challenges and Objectives; Cloud data life cycle; Common Attacks in Cloud; Security Standard: Confidentiality, Integrity, and Availability (CIA), Authentication and Authorization, Access controls: Role-based access controls, multifactor authentication, Security policy Management, IAM; Security Governance and Open Security Architecture; Monitoring and Auditing.		
Total Lecture Hours		60 hours
Textbooks:		
	Authors Name	
1. Cloud Computing: Implementation, Management and Security, CRC Press, 2017.	Ritting house, John W., And James F. Ransome	
2. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2013.	Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra	
3. Mastering Cloud Computing, Tata McGraw-Hill, 2013.	Raj Kumar Buyya, Christian Vecchiola, S. Thamaraiselvi,	
Reference Books:		
	Authors Name	
1., Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.	Toby Velte, Anthony Velte, Robert Elsenpeter	
2.Cloud Application Architectures: Building Applications and Infrastructure in The Cloud: Transactional Systems for EC2 And Beyond (Theory in Practice), O’Reilly, 2009.	George Reese,	
Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_2924501508992_2_640000_shared/overview	5Hrs 40Min
Video Lectures	https://www.youtube.com/watch?v=ynPjd9TKLc4 https://www.youtube.com/watch?v=b1b6JTYnbjU https://www.youtube.com/watch?v=ab036IW3ASw https://www.youtube.com/watch?v=HTb_VYOE4WM https://www.youtube.com/watch?v=9CoMa2D7LwI	28Min 15Sec 54Min 57Sec 29Min 44Sec 55Min 57Sec 5Hrs5 9Min
Web References	https://www.tutorialspoint.com/cloud_computing https://www.cisco.com/c/en/us/solutions/cloud.html https://www.tutorialspoint.com/cloud_computing https://www.cloudskillsboost.google https://learn.microsoft.com/en-us/azure	

Advanced Switching: Advanced STP features, Multilayer switching, QoS concepts
Advanced Routing: Advanced OSPF configurations, BGP fundamentals and configuration, Route redistribution and filtering
WAN Technologies: MPLS and VPNs, WAN topologies and protocols (e.g., GRE, DMVPN)

Unit-5	Network Design and Troubleshooting	10 hours
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Network Design Principles: Hierarchical network design, Enterprise network architecture, High availability, and redundancy

Network Troubleshooting: methodologies and tools, Common network issues and resolutions, Case studies and real-world scenarios

Wireless Networks: Wireless technologies and standards, Wireless LAN configuration and management, Wireless security protocols

Emerging Technologies: IoT and cloud networking, Network virtualization

Total Lecture Hours	60 hours
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Textbooks:

	Authors Name
1. Computer Networks, Pearson Education, Edition 6th 2019	Andrew Tanenbaum
2. Data and Computer Communication, Pearson, 10th Edition, 2017	William Stallings

Reference Books:

	Authors Name
1.Computer Networking, A Top-Down Approach”, Pearson. Eighth Edition,2021	Kurose and Ross
2.Computer Networking A Top- Down Approach” 8th Edition, Pearson Education 2022	James F. Kurose

Self-Study Content Links:

	Duration (in Hrs)
MOOCs	6Hrs 33Min
Video Lectures	38Min 19Sec 4Min 31Sec 22Min 7Sec 4Min 4Sec 4Min 30Sec
Web References	

Course Code: CMCA0303		Software Engineering				L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)						3	0	0	3
Pre-requisite: Basic knowledge about software and its types, Basic knowledge of any programming language.									
Course Objectives:									
To enable students to develop methods and procedures for software development that can scale up for large systems and that can be used consistently to produce high-quality software at low cost and with a small cycle of time. Students will be able to understand the concepts of requirement engineering, designing and its principles, testing techniques and maintenance methods for effective software development.									
Course Outcome: After completion of the course, the student will be able to						Bloom's Knowledge Level (KL)			
CO1	Explain various software characteristics and analyze different Software Development Models.					K2			
CO2	Demonstrate the contents of an SRS and apply basic software quality assurance practices to ensure that design and development meet or Exceed applicable standards.					K3			
CO3	Compare various methods for software design.					K6			
CO4	Describe testing strategy for software systems, employ techniques such as unit testing, test-driven development and functional testing. Compare various methods for software design.					K5			
CO5	Explain maintenance and analyze different techniques for project Management.					K4			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)									
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
CO1	3	3	3	3	2	2	3	3	
CO2	3	3	2	3	3	2	3	3	
CO3	2	3	3	3	3	2	2	3	
CO4	3	3	3	3	3	2	3	3	
CO5	3	3	3	3	3	3	3	3	
Course Contents / Syllabus									
Unit-1		Introduction						10 hours	
Introduction: Evolving role of Software, Software Characteristics, Software Crisis, Silver Bullet, Software Myths, Software Process, Software Engineering Phases, Team Software Process (TSP), Emergence of Software Engineering, Software process, Project, and Product. Software Process Models: SDLC, Waterfall Model, Prototype Model, Spiral, Model, Iterative Model, Incremental Model, V Process Model, Agile Methodology									
Unit-2		Software Requirement						08 hours	
Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis Documentation, Review, and Management of User Needs, Feasibility Study, Information Modelling, Decision Tables, SRS Document, IEEE Standards for SRS.									
Unit-3		Software Design						09 hours	
Software Design: Software Design: Design principles, the design process; Design concepts: Abstraction Refinement, Modularity (Cohesion and coupling), Software Architecture (Function Oriented Design, Object Oriented Design), Control Hierarchy (Top-Down and Bottom-Up Design), Structural partitioning, Data structure									
Software procedure, Information hiding. Software Measurement and Metrics: Various Size Oriented Measures, Function Point and Design Heuristics for effective modularity, Cyclomatic Complexity Measures: Control Flow Graphs.									
Unit-4		Software Testing						10 hours	

Software Testing: Testing Objectives, Unit Testing, Integration Testing, User Acceptance Testing, Regression Testing, testing for Functionality and Testing for Performance, Top Down and Bottom, Up Testing Strategies: Test Drivers and Test Stubs, Test Beds and Test Oracle, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products.

Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, and Compliance with Design and Coding Standards.

Software Quality Assurance (SQA): Quality concepts, Software quality assurance, SQA activities, Formal approaches to SQA; Statistical software quality assurance; CMM, The ISO standard.

Unit-5	Project Maintenance and Management Concepts	08 hours
Software Maintenance Preventive, Corrective, and Perfective Maintenance, Project Management concepts, Planning the Software Project, Cost of Maintenance, Estimation—Empirical Estimation COCOMO, A Heuristic Estimation Techniques, Staffing Level Estimation, Team structures, Risk analysis and management, Configuration Management, Software re-engineering, Reverse Engineering, restructuring, Forward engineering, Clean Room software engineering, CASE Tools.		
Total Lecture Hours		45 hours
Textbooks:		
	Authors Name	
1. Software Engineering, New Age International Publishers, Fourth Edition, 21 August 2022	K.K. Aggarwal, Yogesh Singh	
2. Software Engineering: A Practitioner's Approach, McGraw-Hill Education, 9th Edition, 2020	Roger S. Pressman, Bruce R. Maxim	
3. Fundamentals of Software Engineering, PHI Learning, 5th Edition, 2018	Rajib Mall	
Reference Books:		
	Authors Name	
1. Software Engineering, Wiley. 1 January 2010	Pankaj Jalote	
2. Software Engineering, Cengage Learning. 2009	Kassem Saleh	
3. Software Engineering, Addison-Wesley. 9th Edition. 29 October 2017	Rajib Mall	
Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview	6Hrs 33Min
Video Lectures	https://www.youtube.com/watch?v=uJpQlyT_CK4&list=PLxCzCOWd7aiEed7SKZBnC6ypFDWYLRvB2	14Min 8Sec
	https://www.youtube.com/watch?v=kcvEiMF0coE&list=PLxCzCOWd7aiEed7SKZBnC6ypFDWYLRvB2&index=2	10Min 4Sec
	https://www.youtube.com/watch?v=yd6uxnBIIQg&list=PLxCzCOWd7aiEed7SKZBnC6ypFDWYLRvB2&index=8	5Min 53Sec
	https://www.youtube.com/watch?v=Xs6E-MAJbfE&list=PLxCzCOWd7aiEed7SKZBnC6ypFDWYLRvB2&index=11	8Min 01Sec
	https://www.youtube.com/watch?v=IQFfMb2T2PY&list=PLxCzCOWd7aiEed7SKZBnC6ypFDWYLRvB2&index=20	3Min 11Sec
Web References	https://www.geeksforgeeks.org/software-engineering https://www.tutorialspoint.com/software_engineering https://nptel.ac.in/courses/106105182 https://www.javatpoint.com/software-engineering-tutorial https://www.computer.org/technical-committees/software-engineering	

Course Code: CMCA0311			Advance Concepts of Analytics				L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)							3	0	0	3
Pre-requisite: Creative thinking and which is being used by the creative talent in your business areas.										
Course Objectives:										
To help students understand digital marketing practices, the inclination of digital consumers and role of content marketing. To provide understanding of the concept of E-commerce and develop marketing strategies in the virtual world to impart learning on various digital channels and how to acquire and engage consumers online. To provide insights on building organizational competency by way of digital marketing practices and cost considerations. To develop understanding of the latest digital practices for marketing and promotion.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Discuss how to check for data integrity. Discover data cleaning techniques using spreadsheets.						K2			
CO2	Develop basic SQL queries for use on databases. Apply basic SQL functions for cleaning and transforming data.						K5			
CO3	Examine the importance of data visualization. Learn how to form a compelling narrative through data stories.						K4			
CO4	Explain an understanding of how to use Tableau to create dashboards and dashboard filters, discover how to use Tableau to create effective visualizations. Explore the principles and practices involved with effective presentations.						K2			
CO5	Discuss Big Data Characteristics What, why, When, Limitation of traditional approaches and models.						K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	2	2	2	-	1	-	2		
CO2	2	3	3	3	1	1	-	2		
CO3	2	2	2	2	1	3	1	2		
CO4	1	2	3	3	2	3	1	2		
CO5	3	3	2	2	-	1	1	3		
Course Contents / Syllabus										
Unit-1		Introduction to Virtualization Technologies and Hypervisors							10 hours	
Process Data from Dirty to Clean: Process Data from Dirty to Clean. Introduction to focus on integrity, why data integrity is important, balancing objectives with data integrity, dealing with insufficient data, the importance of sample size, using statistical power, Determine the best sample size Clean it up! Why data cleaning is important Recognize and remedy dirty data, Data-cleaning tools and techniques, cleaning data from multiple sources, Data-cleaning features in spreadsheets, Optimize the data-cleaning process.										
Unit-2		Advance Data Cleaning							08 hours	
Advance Data Cleaning: Data Cleaning and Pre-Processing, Exploring raw data, Missing values, Noisy Data, Data Integration-The Entity Identification Problem, Redundancy and Correlation Analysis, Tuple Duplication, Detection and Resolution of Data Value Conflicts.										
Unit-3		Share Data through the Art of Visualization							08 hours	
Share Data through the Art of Visualization: Communicating your data insights, Introduction to communicating your data insights, Understanding data visualization: Why data visualization matters, Connecting images with data, A recipe for a powerful visualization, Dynamic visualizations, Design data visualizations: Elements of art, Data visualization impact, Design thinking and visualizations										
Unit-4		Introduction to Power BI							09 hours	

Introduction to PowerBI: Working with data – Importing from flat files, Excel files, other Sources, Data Sources in Power BI Desktop, Loading Data in Power BI Desktop, Views in Power BI Desktop, Query Editor in Power BI, Transform, Clean, Shape, and Model Data Manage Data Relationship, editing a Relationship, Cross Filter Direction, Saving Work file Measures. Data Analysis Expressions – Introduction to Power Query – Introduction to Power View – Power View visualizations – Power View filtering options –Introduction to Power Map – Preparing geospatial data – Publish from Power BI desktop – Publish Dashboard to Web.

Unit-5	Introduction to Big Data	10 hours
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Introduction to Big Data

Evolution – Data as Economy - What is Big Data – Sources of Big Data. – Big Data Myths - Characteristics of Big Data 6Vs – Big Data Use cases - Big data- Challenges of Conventional Systems-Data Processing Models – Limitation of Conventional Data Processing Approaches - Data Discovery-Traditional Approach, Big Data Technology: Big Data Exploration - Data Augmentation – Operational Analysis – 360 View of Customers – Security and Intelligence – Data Analytics – Classification - Descriptive – Diagnostic -Predictive – Prescriptive – Augmented – Pervasive Analytics

Total Lecture Hours | **45 hours**

Textbooks:

	Authors Name
1.Digital Marketing, Oxford University Press India, November 2015	Vandana, Ahuja
2. Strategic Digital Marketing: Top Digital Experts.1st Edition 2013	Eric Greenberg, and Kates, Alexander

Reference Books:

	Authors Name
1.E,Commerce: Strategy, Technologies and Applications, McGraw Hill Education.1st July 2017	David Whitely

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013841_8774889267206655_shared/overview	1 Hrs
Video Lectures	https://www.youtube.com/watch?v=9gfER4p1jXM&list=PLLqEsfz6HOalezPFBfibMfoewWICKigHk&index=3	28Min 46Sec
	https://www.youtube.com/watch?v=8LgR42WCRI0&list=PLLqEsfz6HOalezPFBfibMfoewWICKigHk&index=4	28Min 57Sec
	https://www.youtube.com/watch?v=SUXOFrhWsAQ&list=PLLqEsfz6HOalezPFBfibMfoewWICKigHk&index=5	37Min 38Sec
	https://www.youtube.com/watch?v=AZlpYHup1Cw&list=PLLqEsfz6HOalezPFBfibMfoewWICKigHk&index=6	50Min 34Sec
	https://www.youtube.com/watch?v=XaHFNhHfXwQ&list=PLLqEsfz6HOalezPFBfibMfoewWICKigHk&index=7	26Min 1Sec
Web References	https://www.ibm.com/topics/big-data-analytics https://www.tableau.com/learn/training https://sqlbolt.com	

Course Code: CMCA0312		Advance Concepts of Optimization				L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)						3	0	0	3
Pre-requisite: Basic Marketing Concepts, Basic Knowledge of Computers									
Course Objectives:									
To introduce students to Understand how search engine optimization and social media have used the way businesses sell to consumers. To help students to Recognize how marketers use the Google SEO to influence purchase and sell decisions on digital platforms using SEO content and tools. To help students to Appreciate the benefits of integrating Google SEO Fundamentals with the advantages of sell and purchase marketing strategies. To Identify the benefits of Optimize a website for Google search to a business of using social media to engage an audience. To Build, manage, and sustain an active Advance Content and social tactics to optimize SEO.									
Course Outcome: After completion of the course, the student will be able to						Bloom's Knowledge Level (KL)			
CO1	Discuss the important concepts of search engine optimization.					K2			
CO2	Describe to Recognize how marketers use Google SEO to influence purchase and sell decisions on digital platforms using SEO content and tools.					K1			
CO3	Analyze the benefits of Google SEO Fundamentals with the advantages of sell and purchase marketing strategies.					K4			
CO4	Discuss the benefits of Optimize a website for Google search to a business of using social media to engage an audience.					K2			
CO5	Implement the use of an Advance Content and social tactics to optimize SEO.					K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)									
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
CO1	3	1		1		2		1	
CO2	2	3	1	2		2	1	1	
CO3	2	3	2	2		1	1	1	
CO4	2	2	2	3	1	3	1	1	
CO5	1	2	3	3	2	2	2	3	
Course Contents / Syllabus									
Unit-1		Introduction to Search Engine Optimization							08 hours
Introduction to Search Engine Optimization: Introduction To SEO, Technical SEO, Keyword Research Process, Content Planning and Creation, On-Page SEO, Off-page SEO, Avoid Negative SEO, Local SEO									
Unit-2		Introduction to Google SEO							10 hours
Introduction to Google SEO: Introduction to Google SEO: Introduction to Google SEO, SEO as a Career, How Search Engines Work, Evolution of SEO , Current SEO Best Practices: Current SEO Best Practices, Introduction to Search Engine Algorithms, SEO of Today, Tomorrow and Beyond: Featured Snippets and Rich Snippets, BERT, Evolution of Keyword Optimization, Your Audience and Building Personas: Your Audience and Building Personas, Persona Development									

Unit-3	Google SEO Fundamentals	09 hours
Google SEO Fundamentals: Getting Started and Introduction to On-page SEO: Introduction to On-page SEO, Key Areas of SEO Analyzing a Website Using a Web Crawler, Introduction to Off-page SEO: Introduction to Off-page SEO, Off-site SEO Elements, Introduction to Technical SEO: Introduction to Technical SEO, Laying the Structural Foundation With Technical SEO, Keyword Theory & Research: Keyword Theory & Research, Introduction, Choosing the Right Keywords		
Unit-4	Optimizing a website for Google Search	09 hours
Optimizing a website for Google Search: Applying Keyword Research Introduction, How to Perform a Competitive Keyword Analysis, Analyzing Your Competition, Advanced SEO Strategies: Advanced On-Page SEO, Benefits of a Competitive Content Analysis, Dissecting the Competitive Content Analysis, Mobile/App SEO and Metrics & KPIs: Mobile/App SEO, External App Optimization, App Store Optimization, Creating an SEO Campaign: Creating an SEO Campaign, Scoping an SEO Project, Importance of Achieving Quick Wins, Developing SMART Project Goals.		
Unit-5	Advance Content and social tactics to optimize SEO	09 hours
Advance Content and social tactics to optimize SEO: Introduction to Advanced Content and Social Tactics to Optimize SEO: Content Marketing Ecosystem, Basics of SEO Recap, Social Media Marketing: Social Media Marketing, Social Media Links & SEO, Influence Marketing: Influence Marketing, Building the Relationship, Advanced: Targeted Advertising Creating World Class Content: Creating World Class Content, Market Data on Content Marketing.		
Total Lecture Hours		45 hours
Textbooks:		
	Authors Name	
1. Digital Marketing for Dummies Publisher: John Wiley & Sons, Inc, March 2017	Ryan Deiss & Russ Henneberry	
2. Youtility, Publisher: Gildan Media, LLC 2013	Jay Baer	
Reference Books:		
	Authors Name	
1. Epic Content Marketing, Publication: McGraw Hill Education,2013	Joe Pulizzi	
Self-Study Content Links:		
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01350156414_28623368606/overview	Duration (in Hrs) 1 Hrs
Video Lectures	https://www.youtube.com/watch?v=L_11kpg82bM&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=2	36Sec
	https://www.youtube.com/watch?v=eJ53AuVRMXc&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=8	6Min45Sec
	https://www.youtube.com/watch?v=wbWOMTUeyJc&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=9	20Min 11Sec
	https://www.youtube.com/watch?v=zIVDys3GtMw&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=18	10Min 33Sec 3Min1Sec
Web References	https://developers.google.com/search/docs/fundamentals https://analytics.google.com/analytics/academy https://blog.hubspot.com/marketing/seo https://moz.com/beginners-guide-to-seo https://blog.hubspot.com/marketing	

Course Code: CMCA0313			Advance Software Testing				L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)							3	0	0	3
Pre-requisite: Basic knowledge about software and its types. Basic knowledge of any programming Language										
Course Objectives:										
Explain how and why the timing and level of involvement for the Test Analyst varies when working with different software development lifecycle models Summarize the appropriate tasks for the Test Analyst when conducting analysis activities for a given project scenario, select the appropriate design level for test cases (high level or low-level) Explain the issues to be considered in test case design Summarize the appropriate tasks for the Test Analyst when conducting test execution activities										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Perform the appropriate testing activities based on the software development life cycle being used						K2			
CO2	Determine the proper prioritization of the testing activities based on the information provided by the risk analysis.						K2			
CO3	Select and apply appropriate test techniques to ensure that tests provide an adequate level of confidence, based on defined coverage criteria.						K3			
CO4	Determine the appropriate types of functional testing to be performed.						K3			
CO5	Improve the efficiency of the test process with the use of tools						K5			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	2	2	1	-	1	-	1		
CO2	2	3	2	1	-	1	2	1		
CO3	2	3	3	2	1	1	-	1		
CO4	2	3	2	2	-	1	-	1		
CO5	1	2	2	3	1	1	1	2		
Course Contents / Syllabus										
Unit-1		Introduction							08 hours	
Introduction: Testing in the Software Development Lifecycle, Test Analysis, Test Design, Low-level and High-level Test Cases, Design of Test Cases, Test Implementation, Test Execution										
Unit-2		The Test Analyst's Tasks in Risk-Based Testing							08 hours	
The Test Analyst's Tasks in Risk-Based Testing: Introduction, Risk Identification, Risk Assessment, Risk Mitigation, Prioritizing the Tests, Adjusting Testing for Future Test Cycles										
Unit-3		Test Techniques							10 hours	
Test Techniques: Introduction, Black-Box Test Techniques, Equivalence Partitioning, Boundary Value Analysis, Decision Table Testing, State Transition Testing, Classification Tree Technique, Pairwise Testing, Use Case Testing, Combining Techniques, Experience-Based Test Techniques, Error Guessing, Checklist, Based Testing, Exploratory Testing, Defect-Based Test Techniques.										
Unit-4		Testing Software Quality Characteristics							10 hours	
Testing Software Quality Characteristics: Introduction, Quality Characteristics for Business Domain Testing, Functional Correctness Testing, Functional Appropriateness Testing, Functional Completeness Testing, Interoperability Testing, Usability Evaluation, Portability Testing										
Unit-5		Reviews							09 hours	

Reviews: Introduction, Using Checklists in Reviews, Requirements Reviews, User Story Reviews, Test Tools and Automation, Types of Test Tools, Test Design Tools, Test Data Preparation Tools, Automated Test Execution Tools.

Total Lecture Hours | **45 hours**

Textbooks:

	Authors Name
1. Managing the Testing Process (2nd edition), John Wiley & Sons: New York, 2002	Rex Black
2. Advanced Software Testing, Volume 1", Rocky Nook, 2009	Rex Black

Reference Books:

	Authors Name
1. Black-box Testing, John Wiley & Sons, 1995	Boris Beizer

Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0138418210035712004968_shared/overview	1 Hrs 55M
Video Lectures	https://www.youtube.com/watch?v=T0TynxN77oY https://www.youtube.com/watch?v=9GthPTi1Nqc https://www.youtube.com/watch?v=l239yuyq9xQ https://www.youtube.com/watch?v=AloUqnD7aPs https://www.youtube.com/watch?v=mbMEmS-zmJQ	38Sec 6Min 11Sec 6Min 13Sec 6Min 57Sec 9Min50Sec
Web References	https://www.softwaretestinghelp.com https://www.guru99.com/software-testing.html https://www.istqb.org/ https://www.selenium.dev/documentation/	

Course Code: CMC0314			CRM Advance Administration				L	T	P	C
Course Offered in: MCA Second Year (3 rd Semester)							3	0	0	3
Pre-requisite: Computer literacy, Fundamental Knowledge of CRM, Problem-Solving Skills										
Course Objectives:										
Understand the importance of Security in Database Learn the concepts of Objects and Applications Familiarize with concepts of Auditing Learn the concepts of maintaining data in cloud Get knowledge of Data Analytics & Management.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Describe the importance of Security in Database						K1			
CO2	Apply the concepts of Objects and Applications						K3			
CO3	Describe the concepts of Auditing						K3			
CO4	Explain the concepts of maintaining data in the cloud						K5			
CO5	Discuss the knowledge of Data Analytics & Management						K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	2	1	1	-	-	-	1		
CO2	2	3	2	2	1		2	1		
CO3	2	3	3	2	1			1		
CO4	2	3	3	3	1	-	2	1		
CO5	2	2	1	1	2	3	2	2		
Course Contents / Syllabus										
Unit-1	Security and Access								10 hours	
Security and Access: Enhanced Transaction Security, Session-Based Permission Sets and Security, Company-Wide Org Setting, Custom Objects: Quick Look.										
Unit-2	Objects and Applications								09 hours	
Objects and Applications: Lightning Experience Rollout, Lightning Experience features, Lightning Knowledge setup and customization.										
Unit-3	Auditing and Monitoring								08 hours	
Auditing and Monitoring: Event monitoring, Event Monitoring Analytics App, Leads & opportunities for lightning experience, Product, quotes & Contracts, Territory management basics.										
Unit-4	Cloud Applications								08 hours	
Cloud Applications: Advanced Territory Management, Path & workspaces, Web chat basics, Omni channel for lightning experience identity for customers, External services big object Basics										
Unit-5	Data and Analytics Management								10 hours	
Data and Analytics Management: Application Lifecycle and Development Models, change set Development Model, Change set development model, Advance Formula, Apex Triggers, Process Automation Specialist										
Total Lecture Hours									45 hours	
Textbooks:										
						Authors Name				
1. Customer Relationship Management, Wiley Dream tech ,2019						Bhasin				
2.Salesforce for beginners”, Packet Publishing 2020						Sharif Shalane				
3.Customer Relationship Management: Concepts and Cases, PHI Learning, 2nd Edition 2018						Alok Kumar Rai				
Reference Books:										
						Authors Name				

1.Salesforce: A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon (Online)		Christopher Mathew Spencer
2.Salesforce Platform Developer by Vandeveld Jain Edition Ist 2018		Vandeveld Jain
3.Learning Salesforce Development by Paul Battisson E,book (Online)		Paul Battisson
Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384351202229452840551_shared/overview	1 Hrs 2Min
Video Lectures	https://www.youtube.com/watch?v=Kn192OdHGKg https://www.youtube.com/watch?v=al60A0C2nAg https://www.youtube.com/watch?v=g1R_QJS0q-Q https://www.youtube.com/watch?v=1oPiBgMcwZw https://www.youtube.com/watch?v=bllHYNGiJC4	49Min 47Sec 01Min 20Sec 02Min 17Sec 06Min 38Sec 4Min3 0Sec
Web References	https://trailhead.salesforce.com https://learn.microsoft.com/en-us/dynamics365/ https://docs.oracle.com/en/cloud/saas/sales https://www.ibm.com/topics/customer-relationship-management https://apexapps.oracle.com/pls/apex	

Servlets Servlet Overview and Architecture, Servlet Life Cycle, Handling HTTP methods, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session

Java Server Pages (JSP) Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries.

Total Lecture Hours 72 hours

Textbooks:

	Authors Name
1. HTML, DHTML. JavaScript, and PHP”, BPB Publications, 5th Edition, 2005	Bayross Ivan
2. Web Technology and Design”, New Age International, Second edition, 2022	Xavier, C

Reference Books:

	Authors Name
1. The Complete Reference Internet”, TMH, 2nd Edition 2002	Margaret Levine Young

Self-Study Content Links:

	Duration (in Hrs)
MOOCs	1 Hrs 55M
Video Lectures	18Min 25Sec 47Sec 15Min 14Sec 8Min 11Sec 2Min 44Sec
Web References	

List Of Practical's

S.No.	Name of Experiments/ Programs	CO
1	Write a program for different formatting tags used in HTML.	CO1
2	Write a program for different types of lists. Write a program to show implementation of nested list.	CO1
3	Write a program for printing class timetable showing use of rowspan and colspan.	CO1
4	Program to show the use of target attribute with different values.	CO1
5	Write a program to create a web page using img tag with all its attributes. Write a program to create a web page using image as hyperlink. Create a small website of four pages showing use of external link.	CO1
6	Write a program to set a background image for both the page and single elements on the page and control the repetition of the image with the background repeat property.	CO1
7	Write a program to create a web page showing the use of font and text attribute of CSS.	CO1
8	Write a program to create a web page showing the use of color and background attribute of CSS.	CO1
9	Write html code to develop a webpage having two frames that divide the webpage into two equal rows and then divide the row into equal columns fill each frame with a different background color.	CO1
10	Write a program to create a web page showing the use of inline, internal and External CSS.	CO1
11	Write a program to create a web page showing the use of implementation of BOX model in CSS.	CO1
12	Write a program to create a web page showing the use of CSS positioning.	CO1

13	Write a program to design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags. Create your resume using HTML tags also experiment with colors, text, link, size and also other tags you studied.	CO1
13	Write a program to design web pages for your college containing a description of the courses, departments, faculties, library etc, use href, list tags. Create your resume using HTML tags also experiment with colors, text, link, size and also other tags you studied.	CO1
14	Design the static web pages required for an online bookstore web site 1. Design The login page contains the user's name and the password of the user to authenticate. 2. Design The catalogue page should contain the details of all the books available in the web site in a table. Design of the cart page and the registration page required for online bookstore.	CO1
15	Write a program to create a "registration form" with the following fields - Name (Text field) - Password (password field) - E-mail id (text field) - Phone number (text field) - Sex (radio button) - Date of birth (3 select boxes) - Languages known (check boxes – English, Telugu, Hindi, Tamil) Address (text area)	CO1
16	Design a web page using CSS (Cascading Style Sheets) which includes the following: 1) Use different font, styles: In the style definition you define how each selector should work. Then, in the body of your pages, you refer to these selectors to activate the styles.	CO1
17	Write a JavaScript Program to Print Hello World.	CO2
18	Write a JavaScript Program to Add Two Numbers.	CO2
19	Write a JavaScript Program to Find the Square Root	CO2
20	Write a JavaScript Program to Calculate the Area of a Triangle.	CO2
21	Develop simple calculator for addition, subtraction, multiplication, and division operation using JavaScript	CO2
22	Write a JavaScript Program to Swap Two Variables	CO2
23	Write a JavaScript Program to Convert Celsius to Fahrenheit	CO2
24	Write a JavaScript Program to Convert Decimal to Binary	CO2
25	Write a JavaScript Program to Check if a number is Positive, Negative.	CO2
26	JavaScript Program to Find the Factorial of a Number	CO2
27	JavaScript Program to Check Prime Number	CO2
28	JavaScript Program to Display the Multiplication Table	CO2
29	JavaScript Program to Print the Fibonacci Sequence	CO2
30	JavaScript Program to Check Armstrong Number	CO2
31	JavaScript Program to Find the Sum of Natural Numbers	CO2
32	Write a JavaScript code to enter weekday number and print day name.	CO2
33	JavaScript Program to Set a Default Parameter Value for a Function	CO2
34	JavaScript Program to Illustrate Different Set Operations	CO2

35	JavaScript Program to Check If a Variable is of Function Type	CO2
36	JavaScript Program to Pass Parameter to a set Timeout() Function	CO2
37	JavaScript Program to Pass a Function as Parameter	CO2
38	Create HTML Page with JavaScript which takes Integer number as input and tells whether the number is ODD or EVEN.	CO2
39	Write a program to create dialogue boxes using JavaScript.	CO2
40	JavaScript Program to Create Objects in Different Ways	CO2
41	JavaScript Program to Loop Through an Object	CO2
42	JavaScript Program to Merge Property of Two Objects	CO2
43	JavaScript Program to Remove a Property from an Object	CO2
44	JavaScript Program to Check if a Key Exists in an Object	CO2
45	JavaScript Program to Add Key/Value Pair to an Object	CO2
46	JavaScript Program to Display Date and Time	CO2
47	JavaScript Program to Check Leap Year	CO2
48	JavaScript Program to Format the Date	CO2
49	JavaScript Program to Display Current Date	CO2
50	Write a program to create an Array in JavaScript	CO2
51	JavaScript Program to Convert Objects to Strings	CO2
52	JavaScript Program to Include a JS file in Another JS file	CO2
53	JavaScript Program to Get File Extension	CO2
4	Create a small website for 4 web pages and connect them using external linking.	CO2
55	JavaScript Program to Validate an Email Address	CO2
56	Write a Java Script program for login form validation.	CO2
57	Write JavaScript to validate the following fields of the above registration page. 1. Name (Name should contains alphabets and the length should not be less than 6 characters). 2. Password (Password should not be less than 6 characters length). 3. Email id (should not contain any invalid and must follow the standard pattern name@domain.com) 4. Phone number (Phone number should contain 10 digits only).	CO2
58	Create HTML Page that contains form with fields Name, Email, Mobile No, Gender, Favorite Color and a button now write a JavaScript code to combine and display the information in textbox when the button is clicked.	CO2
59	Write a JavaScript program that creates a button and add a click event listener to log a message when it's clicked.	CO2
60	Write a JavaScript program to create a dropdown menu that shows and hides its options when clicked.	CO2
61	Write a JavaScript function that changes the background color of an element when a mouse enters it.	CO2
62	Write a JavaScript program that implements a "form" validation that displays an error message if a required field is left empty when submitting the form.	CO2
63	Write a program to implement Java Script objects, DOM.	CO2
64	Create table Student for following attributes (ERP, Name, DOB, Father Name, Age, Gender, Address, City, Mobile No) 1. Insert Data in Student Table. Update Student table add following attributes (Course, Roll No).	CO2

65	1. Write a program to execute all DDL query. 2. Write a program to execute all DML query. Write a program to execute all TCL query.	CO2
66	Write Inner Join, Left Join and Right Join Using Students and Employee Table.	CO2
67	Write a program for implementation of statement in JDBC	CO3
68	Write a program Transaction management using statement.	CO3
69	Write a program to Import JDBC packages	CO3
70	Write a program to Register JDBC Driver	CO3
71	Write a program to Open and Close a connection using JDBC	CO3
72	Write a program to Extract data from above created student table.	CO3
73	Program to execute different query using JDBC connection on Student table.	CO3
74	Write a program to establish connection for Database using JDBC	CO3
75	A Program to generate plain text using java beans.	CO3
76	Write a basic Servlet program that prints "Hello, World!" on the web page.	CO4
77	Write a Program to create simple servlet that just generates plain text.	CO4
78	Write a Servlet program displays the current date and time.	CO5
79	Write a servlet program to demonstrate Http Servlet.	CO5
80	A Servlet program that demonstrates session management by storing user data in a session.	CO5
81	Create Servlet Login and Logout Example using Cookies	CO5
82	Create a program to add cookie to HttpServletRequest.	CO5
83	A Servlet program that connects to a database and retrieves data.	CO5
84	Create Servlet Http Session Login and Logout page.	CO5
85	Create a web form which process servlet and demonstrate use of cookies and sessions.	CO5
86	A program to print hello world using JSP.	CO5
87	Creating JSP in Eclipse IDE with Tomcat server	CO5
88	Write a program to print username using JSP scriptlet tag.	CO5
89	Write a program to prints current time using JSP expression tag.	CO5
90	Write a program that declares method using JSP Declaration tag.	CO5
91	Write a program to print the name of the user with message using JSP request implicit object.	CO5
92	Write a program to redirect the response to the Google using JSP response implicit object	CO5
93	Write a program to create an object to set, get or remove attribute or to get session information using session implicit object	CO5
94	Write a program to implement various attribute of JSP page directive.	CO5
95	Write a program to add any type of file using JSP include directive.	CO5
96	Write a program to add tag in your file using JSP taglib directive.	CO5
97	Write a program to create a custom tag that prints the current date and time in JSP.	CO5
Total Hours:72hrs.		

LAB Course Code: CMCA0351			LAB Course Name: Cloud Computing Lab				L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)							0	0	2	1
Pre-requisite: Basic knowledge of Computer Networks, Operating Systems, Programming, Database Management Systems, and Web Technologies.										
Course Objectives:										
To provide hands-on experience in deploying, managing, and scaling applications on cloud platforms, emphasizing cloud services, virtualization, and distributed computing for efficient resource utilization.										
Course Outcome: After completion of the course, the student will be able to								Bloom's Knowledge Level (KL)		
CO1	Discuss about the use of the AWS management console, create, and manipulate Amazon instances.						K2			
CO2	Discuss the encryption and controlling of S3.						K2			
CO3	Describe how to create a private and virtual private cloud.						K2			
CO4	Create an IAM group in cloud.						K5			
CO5	Discuss the steps of the installation of OpenStack.						K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	2	3	3	1	—	—	1		
CO2	3	3	3	3	2	—	—	1		
CO3	2	3	2	3	1	1	1	1		
CO4	3	3	3	3	2	1	1	2		
CO5	3	3	3	3	2	1	1	2		
List Of Practical's										
S. No.	Name of Experiments/ Programs							CO		
1	Navigate the AWS Management Console.							CO1		
2	Create and manipulate Elastic Compute Cloud instances.							CO1		
3	Create AWS EC2 Virtual Machine Using AWS Console.							CO1		
4	Monitoring Virtual Resources in AWS.							CO1		
5	Getting Started with S3 in Cloud.							CO2		
6	Working with EBS in AWS							CO2		
7	Build a relational database server.							CO2		
8	Create private cloud, Designing a Custom VPC (Virtual Private Cloud).							CO3		
9	Create an IAM Group in Cloud.							CO4		
10	Built a RESTful serverless API on AWS.							CO5		
Total Hrs: 15hrs.										

LAB Course Code: CMCA0352		LAB Course Name: Computer Network Lab					L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)							0	0	2	1
Pre-requisite: Students should have basic knowledge of computer networks, IP addressing, operating systems, and network devices such as switches and routers.										
Course Objectives:										
To provide hands-on experience with network design, configuration, and troubleshooting, covering protocols, hardware, and software tools to build and maintain reliable and efficient network systems.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Identify and use various networking components. Understand different transmission media and design cables for establishing a network						K4			
CO2	Implement any topology using network devices						K3			
CO3	Analyze performance of various communication protocols						K4			
CO4	Understand the TCP/IP configuration for Windows and Linux						K2			
CO5	Demonstrate the major software and hardware technologies used on computer networks						K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
CO1		3	2	2	3	1	–	–	1	
CO2		3	3	3	3	2	–	–	1	
CO3		3	3	2	3	1	1	–	1	
CO4		3	2	3	3	1	-	–	2	
CO5		3	3	3	3	2	–	1	2	
List Of Practical's										
S. No.	Name of Experiments/ Programs							CO		
1	Connect and configure basic network devices (switch, router, PC).							CO1		
2	Create straight-through and crossover cables, test connectivity.							CO1		
3	Configure a switch with a hostname, passwords, and basic settings.							CO1		
4	Use commands to explore and clear the MAC address table on a switch.							CO1		
5	Create and assign VLANs on a switch, verify VLAN configurations.							CO2		
6	Configure a router with a hostname, passwords, and basic settings.							CO2		
7	Assign IP addresses to devices, subnet a network, and configure interfaces.							CO2		
8	Configure static routes between two or more routers.							CO2		
9	Set up a router or server as a DHCP server, configure DHCP pools.							CO3		
10	Use ping and traceroute to test connectivity and understand network paths.							CO3		
11	Configure a router on a stick or a Layer 3 switch for inter-VLAN routing.							CO3		
12	Configure STP on switches, test failover scenarios.							CO3		
13	Configure Ether Channel between switches, verify configuration.							CO2		
14	Configure EIGRP on routers, verify and troubleshoot EIGRP.							CO3		
15	Configure OSPF on routers, understand and verify OSPF areas.							CO3		

16	Configure standard and extended ACLs, apply them to interfaces.	CO2
17	Configure static and dynamic NAT, and PAT on a router.	CO2
18	Configure Syslog for logging and NTP for time synchronization.	CO2
19	Configure a basic wireless LAN, set up SSIDs and security settings.	CO2
20	Diagnose and resolve common VLAN and routing problems	CO2
21	Configure SSH for secure remote access to network devices.	CO2
22	Configure basic firewall rules on a router or firewall device.	CO2
23	Configure IPS features on a network device, monitor alerts.	CO1
24	Apply best practices for securing network devices (e.g., disable unused services, secure passwords).	CO5
25	Configure port security on switches to restrict access based on MAC addresses.	CO1
26	Implement VLAN access control policies and verify their effects.	CO2
27	Write simple Python scripts to automate network configurations.	CO4
28	Use Ansible to automate device configuration tasks.	CO5
29	Set up SNMP for monitoring network devices.	CO3
30	Set up and verify IPSec VPN connections between routers.	CO2
31	Configure RSTP or MSTP, and test failover scenarios.	CO3
32	Configure OSPF for multiple areas, verify route propagation.	CO3
33	Configure basic BGP between routers, verify and troubleshoot BGP peering.	CO3
34	Configure route redistribution between different routing protocols.	CO3
35	Implement basic QoS policies on a router or switch.	CO5
36	Configure basic MPLS settings, verify MPLS forwarding.	CO3
37	Set up GRE tunnels between routers, test and verify tunnel connectivity.	CO3
38	Configure and verify DMVPN in a hub and spoke topology.	CO3
39	Configure VRRP or HSRP for gateway redundancy.	CO3
40	Set up and test IP SLA for monitoring and troubleshooting	CO5
41	Create a network design diagram using tools like Cisco Packet Tracer or GNS3.	CO5
42	Configure redundant links and devices, test failover scenarios.	CO5
43	Plan and design a wireless network for an office environment.	CO5
44	Use structured methodologies (e.g., OSI model approach) to troubleshoot network issues.	CO2
45	Use Wireshark to capture and analyze network traffic.	CO5
46	Set up SNMP monitoring on network devices, and use SNMP tools to gather information.	CO3
47	Resolve VLAN-related issues based on a provided network scenario.	CO2
48	Troubleshoot and resolve issues with routing protocols (e.g., OSPF, EIGRP).	CO3
49	Design and implement a network with redundant paths and devices.	CO5
50	Diagnose and resolve common wireless network problems.	CO5
		Total Hrs: 15hrs.

LAB Course Code: CMCA0356			LAB Course Name: Competitive Programming Lab				L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)							0	0	2	1
Pre-requisite: Students should possess basic programming knowledge, problem-solving skills, and familiarity with arrays, strings, recursion, and object-oriented programming concepts.										
Course Objectives:										
To develop students' problem-solving skills, algorithmic thinking, and proficiency in coding by practicing diverse and challenging problems in competitive programming environments.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Utilize data structures and algorithms to efficiently solve a diverse array and string programming challenges.						K3			
CO2	Develop skills in linked list operations to solve complex data structure challenges efficiently						K5			
CO3	Develop skills in advanced algorithms for solving diverse challenges involving trees and graphs efficiently.						K5			
CO4	Develop skills in dynamic programming to efficiently solve complex optimization problems and challenges.						K5			
CO5	Acquire techniques in solving complex backtracking and combinatorial problems across diverse algorithmic scenarios efficiently.						K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	3	3	1	-	—	—	2		
CO2	3	3	3	1	-	—	—	2		
CO3	3	3	3	2	-	-	—	2		
CO4	3	3	3	2	-	-	—	3		
CO5	3	3	3	2	1	-	—	3		
List Of Practical's										
S. No.	Name of Experiments/ Programs							CO		
1	Write a program to find the largest sum contiguous subarray using Kadane's Algorithm.							CO1		
2	Write a program to rotate an array by K steps.							CO1		
3	Write a program to find the intersection of two arrays.							CO1		
4	Write a program to remove duplicates from a sorted array.							CO1		
5	Write a program to find the longest common prefix among a set of strings.							CO1		
6	Write a program to find the first non-repeating character in a string.							CO1		
7	Write a program to check whether a string is a valid palindrome.							CO1		
8	Write a program to group anagrams together.							CO1		
9	Write a program to implement the strStr() function (needle in a haystack).							CO1		
10	Write a program to find the longest substring without repeating characters.							CO1		
11	Write a program to find the maximum product subarray.							CO1		
12	Write a program to find the majority element in an array.							CO1		
13	Write a program to merge overlapping intervals.							CO1		
14	Write a program to find all pairs in an array that sum to a specific target.							CO1		
15	Write a program to check whether a string has all unique characters.							CO1		

16	Write a program to find the minimum window substring.	CO1
17	Write a program to implement atoi() (convert string to integer).	CO1
18	Write a program to multiply two large numbers represented as strings.	CO1
19	Write a program to find the longest palindromic substring.	CO1
20	Write a program to find the median of two sorted arrays.	CO1
21	Write a program to reverse a linked list.	CO2
22	Write a program to detect a cycle in a linked list.	CO2
23	Write a program to merge two sorted linked lists.	CO2
24	Write a program to remove the N-th node from the end of a linked list.	CO2
25	Write a program to find the intersection point of two linked lists.	CO2
26	Write a program to add two numbers represented by linked lists.	CO2
27	Write a program to flatten a multilevel doubly linked list.	CO2
28	Write a program to copy a linked list with random pointers.	CO2
29	Write a program to sort a linked list.	CO2
30	Write a program to swap nodes in pairs.	CO2
31	Write a program to partition a linked list around a value X.	CO2
32	Write a program to clone a linked list with next and random pointers.	CO2
33	Write a program to rotate a linked list.	CO2
34	Write a program to reverse nodes in K-group.	CO2
35	Write a program to find the middle of a linked list.	CO2
36	Write a program to flatten a linked list.	CO2
37	Write a program to remove duplicates from an unsorted linked list.	CO2
38	Write a program to add two numbers without using arithmetic operators.	CO2
39	Write a program to convert a Binary Search Tree into a sorted doubly linked list.	CO2
40	Write a program to check whether a linked list is a palindrome.	CO2
41	Write a program to invert a binary tree.	CO3
42	Write a program to find the Lowest Common Ancestor (LCA) of a binary tree.	CO3
43	Write a program to perform level-order traversal of a binary tree.	CO3
44	Write a program to check whether a binary tree is balanced.	CO3
45	Write a program to serialize and deserialize a binary tree.	CO3
46	Write a program to check whether two binary trees are identical.	CO3
47	Write a program to find the maximum path sum in a binary tree.	CO3
48	Write a program to implement a Tree (Prefix Tree).	CO3
49	Write a program to find the shortest path in a graph using Dijkstra's Algorithm.	CO3
50	Write a program to detect a cycle in a graph.	CO3
51	Write a program to check whether a binary tree is a Binary Search Tree (BST).	CO3
52	Write a program to print all root-to-leaf paths in a binary tree.	CO3
53	Write a program to find the diameter of a binary tree.	CO3
54	Write a program to construct a binary tree from preorder and inorder traversals.	CO3
55	Write a program to find the K-th smallest element in a Binary Search Tree.	CO3
56	Write a program to check whether a binary tree is symmetric.	CO3
57	Write a program to find the deepest node in a binary tree.	CO3

58	Write a program to perform Depth First Search (DFS) algorithm.	CO3
59	Write a program to perform Breadth First Search (BFS) algorithm.	CO3
60	Write a program to find all bridges in a graph using Tarjan's Algorithm.	CO3
61	Write a program to solve the Climbing Stairs problem using Dynamic Programming.	CO4
62	Write a program to find the Longest Increasing Subsequence.	CO4
63	Write a program to solve the 0/1 Knapsack problem.	CO4
64	Write a program to solve the Coin Change problem.	CO4
65	Write a program to find the Longest Common Subsequence.	CO4
66	Write a program to find the Minimum Path Sum in a grid.	CO4
67	Write a program to calculate Edit Distance (Levenshtein Distance).	CO4
68	Write a program to solve the House Robber problem.	CO4
69	Write a program to find the Maximum Product Subarray.	CO4
70	Write a program to count Palindromic Substrings.	CO4
71	Write a program to find the Longest Palindromic Subsequence.	CO4
72	Write a program to solve the Partition Equal Subset Sum problem.	CO4
73	Write a program to solve the Best Time to Buy and Sell Stock with Cooldown problem.	CO4
74	Write a program to solve the Word Break problem.	CO4
75	Write a program to find the Maximum Sum of Three Non-Overlapping Subarrays.	CO4
76	Write a program to solve the Count of Subset Sum problem.	CO4
77	Write a program to find the Maximum Length of Repeated Subarray.	CO4
78	Write a program to solve the Minimum Cost to Merge Stones problem.	CO4
79	Write a program to solve the Decode Ways problem.	CO4
80	Write a program to find the Longest Arithmetic Subsequence.	CO4
81	Write a program to solve the N-Queens problem.	CO5
82	Write a program to generate all subsets of a set.	CO5
83	Write a program to solve the Word Search problem.	CO5
84	Write a program to solve Sudoku using Backtracking.	CO5
85	Write a program to generate all permutations of a string or array.	CO5
86	Write a program to solve the Combination Sum problem.	CO5
87	Write a program to generate all valid parentheses combinations.	CO5
88	Write a program to solve the Rat in a Maze problem.	CO5
89	Write a program to solve the Hamiltonian Path problem.	CO5
90	Write a program to solve the Subset Sum problem.	CO5
91	Write a program to solve the Word Ladder problem.	CO5
92	Write a program to find all combinations of K numbers that add up to N.	CO5
93	Write a program to generate lexicographical permutations of a string.	CO5
94	Write a program to find all unique combinations that sum to a target value.	CO5
95	Write a program to solve the Knight's Tour problem.	CO5
96	Write a program to find all possible solutions to the M-Coloring problem.	CO5
97	Write a program to generate all permutations of a string or array with duplicate elements.	CO5
98	Write a program to solve the Eight Queens puzzle.	CO5

99	Write a program to solve the Cryptarithmic puzzle.	CO5
100	Write a program to find the K-th permutation sequence.	CO5
		Total Hrs:15hrs.

LAB Course Code: CMCA0357		Professional Personality Development Lab					L	T	P	C
Course Offered in: MCA 2 nd Year (3 rd Semester)							0	0	4	2
Pre-requisite: The students should have completed the courses WCC 1 and WCC 2 in the first year.										
Course Objectives:										
This course develops workplace communication and collaboration skills, promotes the effective and responsible use of AI-assisted productivity tools, enhances critical thinking and problem-solving abilities, and strengthens career readiness through practical industry-based simulations.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Recognize personal strengths and professional attributes to demonstrate confidence and professional identity in workplace scenarios.						K2			
CO2	Apply AI-assisted productivity tools and responsible AI practices for academic, professional, and workplace tasks.						K3			
CO3	Analyze professional and academic situations to apply teamwork, collaboration, critical thinking, and problem-solving strategies effectively.						K4			
CO4	Demonstrate effective participation in interviews, group discussions, technical presentations, and professional interactions.						K3			
CO5	Develop career readiness through professional profiling, networking, portfolio development, and workplace simulations.						K6			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	K2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	1	-	-	-	3	-	1	2		
CO2	1	1	1	2	3	1	2	2		
CO3	1	2	1	-	3	-	-	1		
CO4	-	-	-	-	3	1	-	2		
CO5	-	1	-	-	3	-	-	2		
List Of Practical's										
1. Introduction to the Course and Evaluation Scheme										
Students will gain a comprehensive understanding of the course, syllabus, course expectations, and evaluation scheme.										
1.1 Professional Readiness Mapping										
Students will be able to identify professional skill gaps and evaluate workplace readiness through self-assessment activities.										
2. Personal Branding and Professional Identity										
Students will be able to recognize personal strengths, professional attributes, and workplace expectations to build a professional identity.										
2.1 LinkedIn and Digital Presence Optimization										
Students will be able to create and improve professional digital profiles for networking and career opportunities.										
3. Resume/CV/Biodata Building and ATS Optimization										
Students will be able to prepare ATS-friendly resumes/CVs/Biodatas and present achievements effectively for placement opportunities.										
4. Professional Email & Workplace Writing										
Students draft professional emails, escalation responses, and workplace documents with clarity, tone control, and professionalism.										
Prompts for Professional Writing										
Students will be able to design effective prompts for academic, technical, and workplace applications.										

5. Case-Based Group Discussion Simulation

Students participate in business case discussions to demonstrate structured thinking and solution-oriented communication skills.

6. Public Speaking and Stage Confidence

Students will be able to demonstrate confidence and engage with their audience during public speaking activities.

7. Strategic Intervention & GD Leadership Lab

Students practice entering, steering, and concluding discussions using persuasive and diplomatic strategies.

8. The TMAY (Tell Me About Yourself) Masterclass

Students craft and deliver structured self-introductions of varying durations aligned with recruiter expectations.

9. STAR Technique Application Lab

Students respond to behavioral interview questions using structured storytelling techniques based upon "Situation, Task, Action and Result".

10. Idea Pitching and Executive Speaking

Students present ideas confidently without visual aids to strengthen structured thinking and professional speaking skills.

11. Real-Time Workplace Response Challenge

Students respond to workplace situations spontaneously to improve clarity, confidence, and decision-making under pressure.

12. Executive Presentation and Leadership Communication

Students deliver professional presentations focusing on executive presence, clarity, persuasion, and audience engagement.

13. Crisis Communication & Decision-Making

Students analyze workplace crisis situations and deliver clear, responsible, and professional communication responses.

14. Professional Feedback & Workplace Interaction

Students practice giving and receiving feedback professionally while maintaining positive workplace relationships.

15. Interpersonal Intelligence & Conflict Resolution Simulation

Students manage workplace conflicts and navigate hierarchical communication using assertiveness and empathy.

16. Collaborative Problem-Solving & Decision-Making

Students participate in team-based problem-solving activities to develop collaboration, analytical thinking, and workplace decision-making skills.

17. Emotional Intelligence & Workplace Behaviour

Students practice emotional intelligence, adaptability, and professional behaviour for effective workplace relationships and career growth.

18. Virtual Workplace Communication & Meeting Etiquette

Students participate in virtual meetings and collaborative activities to practice online professionalism, meeting etiquette, and digital workplace communication.

19. Advanced Boardroom Presentation

Students deliver executive-style presentations focusing on clarity, brevity, and persuasive impact.

20. Corporate Presence & Non-Verbal Communication

Students practice professional appearance, posture, body language, and workplace etiquette for career success

21. Time Management and Workplace Etiquette

Students will be able to apply time management techniques and workplace etiquette in professional environments.

22. Innovation Thinking & Tech Ideation

Students engage in technology-driven brainstorming, innovation challenges, and solution pitching activities to strengthen creativity and professional confidence.

23. & 24. Corporate Simulation Capstone Activity

Students undergo a complete mock recruitment process (Aptitude Test → Group Discussion → Technical Interview → HR Interview) to demonstrate end-to-end placement readiness.

Total Hrs:30hrs.

Reference Books:

1. **Personality Development: Communication and Soft-Skills** by Santosh Pagare, N. L. Mishra, Neena Sharma, and Padmavathy K.; published by B. S. Publications.
2. **How to Win Friends and Influence People** by Dale Carnegie, published by Penguin Random House.

LAB Course Code: CMCA0359		LAB Course Name: Software Engineering in Mini Project Lab					L	T	P	C
Course Offered in: MCA 2nd Year (3rd Semester)							0	0	4	2
Pre-requisite: Students should have basic knowledge of software engineering principles, programming concepts, system analysis and design, UML modeling, and database management systems.										
Course Objectives:										
To provide practical experience in software development processes, including requirements analysis, design, coding, testing, and maintenance, using modern tools and methodologies for building high-quality software systems.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Discuss ambiguities, inconsistencies, and incompleteness in the requirements specification and state functional and non-functional.						K2			
CO2	Explain different actors and use cases from a given problem statement, and design a use case diagram to associate use cases with different types of relationships						K5			
CO3	Design structural diagrams, behavioral diagram, and interaction diagram for software						K5			
CO4	Demonstrate the modern tools for testing						K3			
CO5	Demonstrate the modern engineering tools for project management						K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	3	2	2	1	–	–	1		
CO2	3	3	3	2	1	–	–	1		
CO3	3	3	3	3	2	1	–	1		
CO4	3	3	3	3	2	1	1	2		
CO5	3	3	3	3	2	2	1	2		
List Of Practical's										
S. No.	Name of Experiments/ Programs								CO	
1	Assignment of mini project based on real world problem and create the requirement statement for assigned mini project								CO1	
2	Prepare an SRS document in line with the IEEE recommended standards on assigned project								CO2	
3	Draw the use case diagram and DFD (0 level, 1 level, 2 level) for assigned project								CO2	
4	Create Structural Diagram: Class diagram, Object diagram. Component diagram, Deployment diagram (assigned project)								CO3	
5	Create Behavioral diagram: Activity diagram, State diagram (assigned project)								CO3	
6	Create Interaction diagram: Sequence diagram, Timing diagram, Collaboration diagram (assigned project)								CO3	
7	Write Test cases for assigned project								CO4	
8	Demo of JIRA software (Test case management & Agile software development).								CO4	
9	Perform forward engineering using any language. (Model to code conversion)								CO5	
10	Perform reverse engineering using any language. (Code to Model conversion)								CO5	
11	Mini Project with CASE Tools								CO5	
Total Hours: 30hrs.										

LAB Course Code: CMCA0311P		LAB Course Name: Advance Concepts of Analytics Lab					L	T	P	C
Course Offered in: MCA 2nd Year (3rd Semester)							0	0	2	1
Pre-requisite: Students should have basic knowledge of statistics, databases, spreadsheets, programming fundamentals, and data handling concepts.										
Course Objectives:										
To equip students with hands-on experience in advanced data analysis, machine learning techniques, and data visualization tools for solving complex real-world problems.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Discuss the fundamentals of Data Management.						K2			
CO2	Analyze the knowledge of Descriptive Analytics.						K4			
CO3	Design the concept of Visualization.						K5			
CO4	Develop a query based on the data management relationship.						K5			
CO5	Demonstrate with concepts of Power BI.						K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	2	2	3	1	–	–	1		
CO2	3	3	3	3	2	–	–	1		
CO3	2	3	3	3	1	1	1	1		
CO4	3	3	3	3	2	1	1	2		
CO5	3	3	3	3	2	1	1	2		
List Of Practical's										
S. No.	Name of Experiments/ Programs							CO		
1	Reading data from text files, excel and explore various commands for doing descriptive analytics.							CO1		
2	Data Processing Techniques: (i) Data Cleaning (ii) Data Transformation-Normalization (iii) Data Integration.							CO2		
3	Basic Visualization in Python							CO3		
4	Load Data, Query Editor in Power BI, Transform, Clean, Shape, and Model Data Manage Data Relationship, editing a Relationship.							CO4		
5	Basic Dashboards in Power BI.							CO5		
Total Hrs:15hrs.										

LAB Course Code: CMCA0312P		LAB Course Name: Advance Concepts of Optimization Lab					L	T	P	C
Course Offered in: MCA 2nd Year (3rd Semester)							0	0	2	1
Pre-requisite: Students should have basic knowledge of digital marketing, internet technologies, web content management, and search engine fundamentals.										
Course Objectives:										
To introduce students to understand how search engine optimization and social media have used the way businesses sell to consumers. To help students to Recognize how marketers use the Google SEO to influence purchase and sell decisions on digital platforms using SEO content and tools. To help students to Appreciate the benefits of integrating Google SEO Fundamentals with the advantages of sell and purchase marketing strategies.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Implement Off Page SEO technique.						K2			
CO2	Implement Off Page for creating Backlink.						K2			
CO3	Explain Local SEO and its ranking factors.						K6			
CO4	Implement YouTube SEO for keyword research, uploading videos and its ranking factors.						K2			
CO5	Implement key elements SEO Audit.						K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	2	2	3	3	1	—	—	1		
CO2	2	3	3	3	2	—	—	1		
CO3	2	3	3	3	1	1	1	1		
CO4	2	3	3	3	2	1	1	2		
CO5	3	3	3	3	2	1	1	2		
List Of Practical's										
S. No.	Name of Experiments/ Programs							CO		
1	Off Page Part 1 a. Backlinks Explanation and Creation b. Link Quality, Link Juice c. Do follow & No follow Anchor Text and its types							CO1		
2	Off Page Part –II a. Earning Backlinks b. Creating Backlinks c. Buying Backlinks d. Making Backlinks							CO2		
3	Local SEO a. Local SEO Explanation b. Ranking Factor c. Google My Business Citation							CO3		
4	YouTube SEO a. YouTube Ranking factor b. YouTube Keyword Research How to Upload videos on YouTube? How to optimized videos on YouTube							CO4		
5	Audit & Strategy a. Key Elements in SEO Audit Report b. Auditing Software's Audit Report Presentation Phase- 1 and Phase -2 SEO Auditing Strategy							CO5		
Total Hrs:15hrs										

LAB Course Code: CMCA0313P		LAB Course Name: Advance Software Testing Lab					L	T	P	C
Course Offered in: MCA 2nd Year (3rd Semester)							0	0	2	1
Pre-requisite: Students should have basic knowledge of software development, programming concepts, software engineering, and software testing fundamentals.										
Course Objectives:										
Learn test plan documentation. Understanding web testing tool, implement bug tracking tool, test, management tool.										
Course Outcome: After completion of the course, the student will be able to							Bloom's Knowledge Level (KL)			
CO1	Create a program and check that it is working properly or not by using Test case.						K5			
CO2	Create a program and give the reason for failure.						K5			
CO3	Identify system specification and report bugs.						K4			
CO4	Design Test case of any application.						K5			
CO5	Analyze and implementation of web testing tool, bug tracking tool, test management tool, open source-testing tool.						K4			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)										
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1	3	2	3	3	1	–	–	1		
CO2	3	3	3	3	2	–	–	1		
CO3	3	3	2	3	1	1	–	1		
CO4	3	3	3	3	2	1	1	2		
CO5	3	3	3	3	2	1	1	2		
List Of Practical's										
S. No.	Name of Experiments/ Programs								CO	
1	Write programs in any Language to demonstrate the working of the following a. constructs: i) do...while ii) while iii) if...else iv) switch v) for								CO1	
2	Write programs in any Language for Matrix Multiplication fails, Introspect the causes for Matrix Multiplication failure and write down the possible reasons for its failure.								CO2	
3	Take any system (e.g., ATM system) and study its system specifications and report the various bugs.								CO3	
4	Write the test cases for any known application (e.g., Banking application)								CO4	
5	Create a test plan document for any application (e.g., Library Management System)								CO4	
6	Study of any testing tool (e.g., Win runner)								CO5	
7	Study of any web testing tool (e.g. Selenium)								CO5	
8	Study of any bug tracking tool (e.g., Bugzilla, bug bit)								CO5	
9	Study of any test management tool (e.g., Test Director)								CO5	
10	Study of any open source-testing tool (e.g., Test Link)								CO5	
Total Hrs:15hrs										

LAB Course Code: CMCA0314P		LAB Course Name: CRM Advance Administration Lab				L	T	P	C
Course Offered in: MCA 2 nd Year		(3 rd Semester)				0	0	2	1
Pre-requisite: Students should have basic computer literacy, fundamental knowledge of CRM concepts, cloud computing basics, and problem-solving skills.									
Course Objectives:									
Computer literacy, Fundamental Knowledge of CRM, Problem-Solving Skills									
Course Outcome: After completion of the course, the student will be able to						Bloom's Knowledge Level (KL)			
CO1	Describe cloud applications					K2			
CO2	Perform how to Set up Salesforce, Case Escalation and Entitlements					K3			
CO3	Use data management tools					K3			
CO4	Acquire the concepts of report design					K3			
CO5	Apply Dashboards and Report Charts on Lightning Pages.					K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)									
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	
CO1	3	2	2	3	1	–	–	1	
CO2	3	3	3	3	2	–	–	1	
CO3	3	3	3	3	2	1	1	1	
CO4	3	3	3	3	2	1	1	2	
CO5	3	3	3	3	2	1	1	2	
List Of Practical's									
S. No.	Name of Experiments/ Programs							CO	
1	Cloud Applications							CO1	
2	Set Up Salesforce Knowledge							CO2	
3	Set Up Case Escalation and Entitlements							CO2	
4	Import and Export with Data Management Tools							CO3	
5	Setup Case Escalation and Entitlements Improve Data Quality for a Recruiting App							CO3	
6	Improve Data Quality for Your Sales and Support Teams							CO3	
7	Evaluate Report Data with Formulas							CO4	
8	Embed Dashboards and Report Charts on Lightning Pages							CO5	
Total Hrs. 15hrs.									