

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR

(AN AUTONOMOUS INSTITUTE)



Affiliated to



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

Evaluation Scheme & Syllabus

For

Master of Computer Applications

Second Year

(Effective from the Session: -2025-26)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA**(An Autonomous Institute)****Master of Computer Applications****MCA****Evaluation Scheme****SEMESTER-III**

S. No	Subject Codes	Subjects	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	Total	PS	TE	PE		
1	BMCA0301	Cloud Computing	Mandatory	3	0	0	30	20	50		100		150	3
2	BMCA0303	Software Engineering	Mandatory	3	0	0	30	20	50		100		150	3
3	BMCA0302	Computer Networks	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	BMCA0355	Web Technology	Mandatory	0	0	6				50		100	150	3
6	BMCA0356	Competitive Programming	Mandatory	0	0	2				50		50	100	1
7	BMCA0351	Cloud Computing lab	Mandatory	0	0	2				50		50	100	1
8	BMCA0352	Computer Networks Lab	Mandatory	0	0	4				50		50	100	2
9		Departmental Elective II Lab	Departmental Elective	0	0	4				50		50	100	2
10	BMCA0359	Software Engineering in Mini Project Lab	Mandatory	0	0	4				50		50	100	2
		TOTAL							200	300	400	350	1250	23

*** 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	Credit
1	BMC0026	Introduction to Cloud Computing	Infosys Wingspan (Infosys Springboard)	5h 44m	
2	BMC0027	Network Fundamentals	Infosys Wingspan (Infosys Springboard)	37h 57m	

List of Departmental Electives: -

S. No	Subject Code	Subject Name	Types of Subjects
1	BMCA0311	CRM Advance Administration	Departmental Elective-II
2	BMCA0312	Advance Concepts of Optimization	Departmental Elective-II
3	BMCA0313	Advance Concepts of Analytics	Departmental Elective-II
4	BMCA0314	Advance Software Testing	Departmental Elective-II

List of Departmental Electives Lab: -

S. No	Subject Code	Subject Name	Types of Subjects
1	BMCA0311P	CRM Advance Administration	Departmental Elective Lab-II
2	BMCA0312P	Advance Concepts of Optimization	Departmental Elective Lab-II
3	BMCA0313P	Advance Concepts of Analytics	Departmental Elective Lab-II
4	BMCA0314P	Advance Software Testing	Departmental Elective Lab-II

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.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Master of Computer Applications

MCA

Evaluation Scheme

SEMESTER-IV

S. No	Subject Codes	Subjects	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credits
				L	T	P	CT	TA	Total	PS	TE	PE		
1	BMCA0401	Robotic Process Automation	Mandatory	3	1	0	30	20	50		100		150	4
2		Departmental Elective-III	Departmental Elective	3	0	0	30	20	50		100		150	3
3	BMCA0451	Robotic Process Automation Lab	Mandatory	0	0	4				50		50	100	2
4		Departmental Elective III – Lab	Departmental Elective	0	0	4				50		50	100	2
5	BMCA0459	Internship	Mandatory	0	0	24				250		350	600	12
		TOTAL							100	350	200	450	1100	23

* 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	Credits
1	BMC0028	HTML5 - The Language	Infosys Wingspan (Infosys Springboard)	13h 17m	
2	BMC0063	Software Engineering Fundamentals - Software Development and Testing	Infosys Wingspan (Infosys Springboard)	16h 56m	

List of Departmental Electives: -

S. No.	Subject Code	Subject Name	Types of Subjects
1	BMCA0411	Administering Cloud and App using Sales force	Departmental Elective-III
2	BMCA0412	Search Engine Optimization	Departmental Elective-III
3	BMCA0413	Business Data Analytics	Departmental Elective-III
4	BMCA0414	Software Quality and Testing	Departmental Elective-III

List of Departmental Electives Lab: -

S. No.	Subject Code	Subject Name	Types of Subjects
1	BMCA0411P	Administering Cloud and App using Salesforce	Departmental Elective Lab-III
2	BMCA0412P	Search Engine Optimization	Departmental Elective Lab-III
3	BMCA0413P	Business Data Analytics	Departmental Elective Lab-III
4	BMCA0414P	Software Quality and Testing	Departmental Elective Lab-III

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.

Subject Name: Cloud Computing							L-T-P [3-0-0]
Subject Code: BMCA0301					Applicable in Department: MCA		
Pre-requisite of Subject: Adequate knowledge of Basics of Computer and computer network.							
Course Objective: 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 Outcomes (CO)							
Course outcome: After completion of this course students will be able to:							Bloom’s Knowledge Level(KL)
CO1	Define the fundamentals of cloud computing and computing techniques.						K1
CO2	Describe the concepts of virtualization and its role in cloud service delivery.						K2
CO3	Discuss various services and architecture of cloud						K2
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
Syllabus							
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping	
I Cloud Computing and its	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.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (1-3)	CO1	

infrastru cture						
II Cloud Virtualiza tion Basics	Basics and need of Virtualizatio n	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	Lectures, PPTs and Notes	8L+ 4P	Assignment/ Experiment (4-7)	CO2
III Service Models and Referenc e Architect ure	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).	Lectures, PPTs and Notes	8L+ 4P	Assignment/ Experiment 8	CO3
IV Resource Manage ment	Resource Managemen t	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.	Lectures, PPTs and Notes	8L+ 4P	Assignment/ Experiment 9	CO4
V Cloud Security, Monitori ng and Auditing	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.	Lectures, PPTs and Notes	8L+ 4P	Assignment/ Experiment 10	CO5
Total				40L+ 20P		
Textbooks						

Sr No	Book Details
1	Ritting house, John W., And James F. Ransome, —Cloud Computing: Implementation, Management andSecurity, CRC Press, 2017.
2	Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2013.
3	Raj kumar Buyya, Christian Vecchiola, S. Thamaraiselvi, —Mastering Cloud Computing, Tata Mcgraw Hill,2013.

Reference Books:

Reference Books	
Sr No	Book Details
1	Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
2	George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in The Cloud:Transactional Systems for EC2 And Beyond (Theory in Practice), O’Reilly, 2009.
Links	

Unit 1: <https://www.youtube.com/watch?v=ynPjd9TKLc4>

Unit 2: <https://www.youtube.com/watch?v=b1b6JTYnbjU>

Unit 3: <https://www.youtube.com/watch?v=ab036IW3ASw>

Unit 4: https://www.youtube.com/watch?v=HTb_VYOE4WM

Unit 5: <https://www.youtube.com/watch?v=9CoMa2D7Lwl>

Subject Name: Software Engineering						L-T-P [3-0-0]		
Subject Code: BMCA0303				Applicable in Department: MCA				
Pre-requisite of Subject: Basic knowledge about software, along with any programming language.								
Course Objective: 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 Outcomes (CO)								
Course outcome: After completion of this course students 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, development meet or exceed applicable standards.						K3	
CO3	Discuss various methods for software design.						K2	
CO4	Discuss testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing.						K2	
CO5	Explain maintenance and different techniques for project management.						K2	
Syllabus								
Unit No	Module Name	Topic covered			Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I	Introduction	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			Lectures, PPTs and Notes	8L+ 4P	Assignment/ Experiment 1	CO1

		process, Project, and Product. Software Process Models: SDLC, Waterfall Model, Prototype Model, Spiral, Model, Iterative Model, Incremental Model, V Process Model, Agile Methodology.				
II Software Requirement	Software Requirement Specifications (SRS)	Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Decision Tables, SRS Document, IEEE Standards for SRS.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (2,3)	CO2
III Software Design	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, Design Heuristics for effective modularity, Cyclomatic Complexity Measures: Control Flow Graphs.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (4-6)	CO3
IV Software Testing	Software Testing	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, 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.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (7-8)	CO4

V Project Maintenance and Management Concepts	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 reengineering, Reverse Engineering, restructuring, Forward engineering, Clean Room software engineering, CASE Tools.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (9-11)	CO5
Total				40L + 20P		

Textbooks

Sr No	Book Details
1	KK Aggarwal and Yogesh Singh, "Software Engineering", New Age International Publishers, Fourth Edition, 21 August 2022
2	RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill ,9 th edition 2020
3	Rajib Mall, Fundamentals of Software Engineering, PHI Publication. ,5 th Edition 2018

Reference Books:

Reference Books

Sr No	Book Details
1	Pankaj Jalote, Software Engineering, Wiley.1 January 2010

2	Kassem Saleh, "Software Engineering", Cengage Learning. 2009
3	Ian Sommerville, Software Engineering, Addison Wesley. 9th Edition. 29 October 2017
Links	
Unit 1: https://youtu.be/x,jqSXYE4S4 Unit 2: https://youtu.be/mGkkZoFc,4l Unit 3: https://youtu.be/sGxgZxwuHzc Unit 4: https://youtu.be/BNk7vni,1Bo Unit 5: https://youtu.be/8swQr0kckZI	

Subject Name: Computer Networks						L-T-P [3-0-0]
Subject Code: BMCA0302				Applicable in Department: MCA		
Pre-requisite of Subject: Basic computer concepts and terminology.						
Course Objective: To develop understanding the concepts, principles, and technologies related to networking. To enhance their knowledge and skills in designing, implementing, and managing network infrastructure. To establish a strong foundation for a career in the field of networking. Classify various IP addressing techniques, sub netting along with network routing protocols and algorithms. Understand various transport layer protocols and their design considerations along with congestion control to maintain Quality of Service. Understand Applications-layer protocols and elementary standards of cryptography and network security.						
Course Outcomes (CO)						
Course outcome: After completion of this course students will be able to:						Bloom’s Knowledge Level(KL)
CO1	Identification of Network Fundamentals					K1
CO2	Classify various IP addressing techniques.					K2
CO3	Description, implementation and verification of IP routing technologies.					K3
CO4	Identification and configuration of LAN switching technologies.					K1
CO5	Explore about network management methods and tools for monitoring and troubleshooting					K2
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I	Introduction to Networks	Basic network concepts, Network architecture and topologies, OSI and TCP/IP models.	Lectures, PPTs and	8L+ 4P	Assignment/Experiment (1-4,23,25)	CO1

Network Fundamentals	Physical Layer	Cabling and network devices, Ethernet standards and technologies	Notes			
	Data Link Layer	MAC addressing and ARP, VLANs and trucking				
	Network Layer	IP addressing and subnetting, IPv4 vs. IPv6, Routing basics and protocols (e.g., RIP, EIGRP, OSPF)				
	Transport Layer	TCP and UDP operations, Port numbers and sockets				
	Application Layer	Common network services and protocols (e.g., HTTP, FTP, DNS)				
II Network Access and IP Connectivity	Switching Concepts	Switch operations and configuration, Spanning Tree Protocol (STP), EtherChannel and link aggregation	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (5-8,13,16-22,26,30,44,47)	CO2
	Routing Concepts	Static and dynamic routing, Routing tables and protocols, Inter, VLAN routing				
	IP Services	DHCP and NAT, NTP and Syslog				
	Network Security Basics	Access control lists (ACLs), Secure access to devices				
III Security Fundamentals and Automation	Network Security Fundamentals	Security threats and vulnerabilities, Mitigation techniques and best practices	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (9-12,14,15,29,31-34,36-39,46,48)	CO3
	Securing Network Devices	Secure device management, implementing device hardening				
	Firewall and IPS	Firewall technologies and types, Intrusion Prevention Systems (IPS)				
	Network Automation	Introduction to network automation, Configuration management tools (e.g., Ansible, Puppet), Basics of network programmability				

	and Programmability	and SDN				
IV Advanced Routing and Switching	Advanced Switching	Advanced STP features, Multilayer switching, QoS concepts	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (27)	CO4
	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)				
V Network Design and Troubleshooting	Network Design Principles	Hierarchical network design, Enterprise network architecture, High availability, and redundancy	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (24,28,35,40-43,45,49,50)	CO5
	Network Troubleshooting	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				40L + 20P		

Textbooks

Sr No	Book Details
1	Behrouz Forouzan, "Data Communication and Networking", Mc Graw Hill Edition, 6 th 2022
2	Andrew Tanenbaum "Computer Networks", Pearson Education, Edition 6 th 2019

3	William Stallings, “Data and Computer Communication”, Pearson, 10 th Edition 2017
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Reference Books:

Reference Books

Sr No	Book Details
1	Kurose and Ross, “Computer Networking, A Top-Down Approach”, Pearson. Eighth Edition, 2021
2	James F. Kurose, “Computer Networking A Top- Down Approach” 8th Edition, Pearson Education 2022

Links

Unit 1: https://nptel.ac.in/courses/106106091
Unit 2: https://www.youtube.com/watch?v=29Qdz0FmvmQ&list=PLbRMhDVUMngf ,
Unit 3: https://www.youtube.com/watch?v=b6f9vh3cd6w&list=PLbRMhDVUMngf ,
Unit 4: https://www.youtube.com/watch?v=8BK70UDgyrc&list=PLbRMhDVUMngf ,
Unit 5: https://www.youtube.com/watch?v=bKHRbqwkMkg&list=PLbRMhDVUMngf ,

Subject Name: CRM Advance Administration						L-T-P[3-0-0]
Subject Code: BMCA0311				Applicable in Department: MCA		
Pre-requisite of Subject: Fundamental Knowledge of CRM and Problem-Solving Skills.						
Course Objective: Understand the importance of Security in Database Learn the concepts of Objects and Applications. Familiarize with concepts of maintaining data in cloud. Get knowledge of Data Analytics & Management.						
Course Outcomes (CO)						
Course outcome: After completion of this course students 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.					K1
CO4	Explain the concepts of maintaining data in cloud.					K2
CO5	Discuss the knowledge of Data Analytics & Management.					K2
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I Security and Access	Security and Access	Enhanced Transaction Security, Session-Bases Permission Sets and Security, Company-wide org Setting, Custom objects: quick look.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 1	CO1
II Objects	Objects and Applications	Lightning Experience Rollout, Lightning Experience features Lightning Knowledge setup and customization.	Lectures, PPTs and	8L+ 4P	Assignment/Experiment (2,3)	CO2

and Applications			Notes			
III Auditing and Monitoring	Auditing and Monitoring	Event monitoring, Event Monitoring Analytics App, Leads & opportunities for lightning experience, Product, quotes & Contracts, Territory management basics.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment (4-6)	CO3
IV Cloud Applications	Cloud Applications	Advanced Territory Management, Path & workspaces, Web chat basics, Omni channel for lightning experience identity for customers, External services big object Basics	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 7	CO4
V Data and Analytics Management	Data and Analytics Management	Application Lifecycle and Development Models, change set Development Model, Change set development model, Advance Formula, Apex Triggers, Process Automation Specialist	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 8	CO5
Total				40L+ 20P		

Reference Books:

Reference Books	
Sr No	Book Details
1	Salesforce: A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon (Online)
2	Salesforce Platform Developer by Vandeveld Jain Edition Ist 2018

3	Learning Salesforce Development by Paul Battisson E,book (Online)
Links	
Unit 1: https://www.youtube.com/watch?v=Kn192OdHGKg	
Unit 2: https://www.youtube.com/watch?v=al60A0C2nAg	
Unit 3: https://www.youtube.com/watch?v=g1R_QJSoq-Q	
Unit 4: https://www.youtube.com/watch?v=1oPiBgMcwZw	
Unit 5: https://www.youtube.com/watch?v=bllHYNGiJC4	

Subject Name: Advance Concepts of Optimization						L-T-P[3-0-0]
Subject Code: BMCA0312				Applicable in Department: MCA		
Pre-requisite of Subject: Basic Marketing Concepts and Knowledge of Computer.						
Course Objective: To introduce students 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 Outcomes (CO)						
Course outcome: After completion of this course students 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	Identify the benefits of Google SEO Fundamentals with the advantages of sell and purchase marketing strategies.					K1
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.					K3
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping

I Introduction to Search Engine Optimization	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	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 1	CO1
II Introduction to Google SEO	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	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 2	CO2
III Google SEO Fundamentals	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	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 3	CO3
IV Optimizing a website for Google Search	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.	Lectures, PPTs and Notes	8L+ 4P	Assignment/Experiment 4	CO4
V Advanced Content and	Advanced Content and	Introduction to Advanced Content and Social Tactics to Optimize SEO: Content Marketing Ecosystem, Basics of SEO Recap, Social	Lectures, PPTs and	8L+ 4P	Assignment/Experiment 5	CO5

e Content and social tactics to optimize SEO	social tactics to optimize SEO	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.	Notes			
Total				40L + 20P		
Textbooks						
Sr No	Book Details					
1	Ryan Deiss & Russ Henneberry, “Digital Marketing for Dummies”, Publisher: John Wiley & Sons, Inc, March 2017					
2	Jay Baer ,“Youtility: Why Smart Marketing Is About Help Not Hype “, , Publisher: Gildan Media, LLC 2013					
Reference Books:						
Reference Books						
Sr No	Book Details					
1	Joe Pulizzi ,“Epic Content Marketing”, Publication: McGraw Hill Education,2013					

Links

Unit 1: https://www.youtube.com/watch?v=L_11kpq82bM&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=2

Unit 2: <https://www.youtube.com/watch?v=eJ53AuVRMXc&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=8>

Unit 3: <https://www.youtube.com/watch?v=wbWOmTUeyJc&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=9>

Unit 4: <https://www.youtube.com/watch?v=zlVDys3GtMw&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=18>

Unit 5: <https://www.youtube.com/watch?v=jkIvYoHCs80&list=PLNfnAKZ4Zsar3Jwb59D0dJeQ-RnsaqpoT&index=32>

Subject Name: Advance Concepts of Analytics						L-T-P[3-0-0]
Subject Code: BMCA0313				Applicable in Department: MCA		
Pre-requisite of Subject: Creative thinking which is being used in your business areas.						
Course Objective: To help students understand digital marketing practices, inclination of digital consumers and role of content marketing. To provide understanding of the concept of E-commerce and developing 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 Outcomes (CO)						
Course outcome: After completion of this course students 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.					K3
CO3	Examine the importance of data visualization. Learn how to form a compelling narrative through data stories.					K1
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
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I Process Data	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,	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 1	CO1

from Dirty to Clean		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.				
II Advance Data Cleaning	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.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 2	CO2
III Share Data through the Art of Visualization	Share Data through the Art of Visualization	Communicating your data insights, Introduction to communicating your data insights, understand 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	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 3	CO3
IV Introduction to PowerBI	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.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 4	CO4
V Introduction to Big Data	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	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 5	CO5

		Intelligence – Data Analytics – Classification - Descriptive – Diagnostic -Predictive – Prescriptive – Augmented – Pervasive Analytics				
Total				40L + 20P		
Textbooks						
Sr No	Book Details					
1	Vandana, Ahuja; Digital Marketing, Oxford University Press India, November 2015					
2	Eric Greenberg, and Kates, Alexander; Strategic Digital Marketing: Top Digital Experts.1 st Edition 2013					
Reference Books:						
Reference Books						
Sr No	Book Details					
1	David Whitely; E,Commerce: Strategy, Technologies and Applications, McGraw Hill Education.1 st July 2017					
Links						

Unit 1: <https://www.youtube.com/watch?v=9gFER4p1jXM&list=PLLqEsfz6HOalezPFBfibMfoewWICkigHk&index=3>

Unit 2: <https://www.youtube.com/watch?v=8LgR42WCRI0&list=PLLqEsfz6HOalezPFBfibMfoewWICkigHk&index=>

Unit 3: <https://www.youtube.com/watch?v=SUXOFrhWsAQ&list=PLLqEsfz6HOalezPFBfibMfoewWICkigHk&index=>

Unit 4: <https://www.youtube.com/watch?v=AZlpYHup1Cw&list=PLLqEsfz6HOalezPFBfibMfoewWICkigHk&index=>

Unit 5: <https://www.youtube.com/watch?v=XaHFNhHfXwQ&list=PLLqEsfz6HOalezPFBfibMfoewWICkigHk&index=>

Subject Name: Advance Software Testing						L-T-P [3-0-0]
Subject Code: BMCA0314				Applicable in Department: MCA		
Pre-requisite of Subject: Basic knowledge about software, along with any programming language.						
Course Objective: 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 Outcomes (CO)						
Course outcome: After completion of this course students 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
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I	Introduction	Testing in the Software Development Lifecycle, Test Analysis, Test Design, Low-level and High-level Test Cases, Design of Test Cases,	Lectures, PPTs and	8L + 4P	Assignment/Experiment 1	CO1

Introduction		Test Implementation, Test Execution	Notes			
II The Test Analyst's Tasks in Risk-Based Testing	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	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 2	CO2
III Test Techniques	Test Techniques	Introduction, Black-Box Test Techniques, Equivalence Partitioning, Boundary Value Analysis, Decision Table Testing, State Transition Testing, Classification Tree Technique, Pair wise Testing, Use Case Testing, Combining Techniques, Experience, Based Test Techniques, Error Guessing, Checklist-Based Testing, Exploratory Testing, Defect-Based Test Techniques.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment 3	CO3
IV Testing Software Quality Characteristics	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	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (4-5)	CO4
V Reviews	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.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (6-10)	CO5
Total				40L + 20P		
Textbooks						

Sr No	Book Details
1	Rex Black, "Managing the Testing Process (2nd edition)", John Wiley & Sons: New York, 2002
2	Rex Black, "Advanced Software Testing, Volume 1", Rocky Nook, 2009

Reference Books:

Reference Books	
Sr No	Book Details
1	Boris Beizer, "Black-box Testing", John Wiley & Sons, 1995
Links	

Unit 1: <https://www.youtube.com/watch?v=T0TynxN77oY>

Unit 2: <https://www.youtube.com/watch?v=9GthPTi1Nqc>

Unit 3: <https://www.youtube.com/watch?v=l239yuyq9xQ>

Unit 4: <https://www.youtube.com/watch?v=AloUqnD7aPs>

Unit 5: <https://www.youtube.com/watch?v=mbMEmS-zmJQ>

Subject Name: Web Technology				L-T-P [0-0-6]		
Subject Code: BMCA0355				Applicable in Department: MCA		
Pre-requisite of Subject: Students are expected to be able to open command prompt window or terminal window, edit a text file, download and install software and understand basic programming concepts.						
Course Objective: To develop an ability to design and implement static and dynamic website						
Course Outcomes (CO)						
Course outcome: After completion of this course students will be able to:						Bloom’s Knowledge Level(KL)
CO1	Discuss the concepts of Web Designing.					K2
CO2	Design a responsive website using HTML and CSS.					K4
CO3	Implement interactive webpages using HTML, CSS, and JavaScript.					K3
CO4	Apply web designing concepts by database connectivity withJDBC in the current market place					K3
CO5	Analyze and build dynamic web pages using client-side programming JavaScript and also Develop the web application using servlet and JSP.					K5
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
Introduction & Web Design	Introduction	Web Technology, Web and web Protocols Governing Web, HTTP Protocol: Request and Response, Web browser and Webservers, Features of Web 2.0	Lectures, PPTs and Notes	4L+10P	Practical/Experiment (1-16)	CO1
	Web Design	Concepts of effective web design, Web design issues including Browser, Bandwidth, display resolution, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation				

II HTML & CSS	HTML	Basics of HTML, formatting, and fonts, commenting code, color, hyperlink, lists, tables, images, Frames and Framesets. HTML forms	Lectures, PPTs and Notes	6L+8P	Practical/Experiment (17-66)	CO2
	Style sheets:	Introduction to CSS, need for CSS, basic syntax, and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, Positioning using CSS.				
III JAVASCRIPT & XML	JavaScript	Client-side scripting with JavaScript, variables, functions, conditions, loops and repetition, Popup boxes.	Lectures, PPTs and Notes	6L+8P	Practical/Experiment (67-75)	CO3
	Advance JavaScript	JavaScript and objects, JavaScript toward objects the DOM and web browser environments, Manipulation using DOM, forms, and validations.				
	DHTML	Combining HTML, CSS and JavaScript, Events, and buttons.				
	XML	Introduction XML				
IV JDBC & Java Beans	Java Database Connectivity (JDBC)	Introduction to JDBC, JDBC architecture, JDBC Connection steps, Perform JDBC manipulation, Statement, Prepared Statements, Transaction Processing	Lectures, PPTs and Notes	6L+8P	Practical/Experiment (76-77)	CO4
	Java Beans	Introduction to Java Beans				
V Servlets & JSP	Servlets	Servlet Overview and Architecture, Servlet Life Cycle, Handling HTTP methods, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session	Lectures, PPTs and Notes	4L+10P	Practical/Experiment (78-97)	CO5
	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				26L + 44P		

Textbooks	
Sr No	Book Details
1	Bayross Ivan, HTML, DHTML. JavaScript, and PHP”, BPB Publications, 5 th Edition, 2005
2	Xavier, C, “Web Technology and Design”, New Age International, Second edition, 2022
3	Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel, Pearson, 5 th edition 2012
Reference Books:	
Reference Books	
Sr No	Book Details
1	Margaret Levine Young, “The Complete Reference Internet”, TMH, 2 nd Edition 2002
2	Santosh Kumar K, “JDBC, Servlets, and JSP Black Book” "Publisher, Dreamtech Press; Second Edition" , 2016
Links	

Unit 1: <http://www.nptelvideos.in/2012/11/internet,technologies.html>

Unit 2: <https://www.youtube.com/watch?v=JsbxB2l7QGY>

Unit 3: https://www.youtube.com/playlist?list=PLJvKqQx2Atf5w_httliQrmqPpL7oLc,W

Unit 4: https://www.youtube.com/playlist?list=PLERZXVMwiajr9lYUA1RVq4_D0VxLuTUHh

Unit 5: <https://www.youtube.com/watch?v=uDwSnnhl1Ng&list=PLsyebzWxl7qtP8Lo9TReqUMkiOp446cV>

Course Objective: To equip students with practical skills in designing, developing, and deploying dynamic web applications using modern technologies, frameworks and tools for front-end and back-end development

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:

**Bloom's
Knowledge Level
(KL)**

CO 1	Describe the concept of web designing and publishing website	K2
CO 2	Apply and design web pages using HTML and CSS	K5
CO 3	Implement JavaScript code to add interactivity and dynamic behavior to webpages.	K3
CO 4	Apply database connectivity using Java Database Connectivity (JDBC)	K3
CO 5	Create dynamic web pages using JSP	K5

List of Practical

Sr No	Program Title	CO Mapping
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.	CO1

	Create a small website of four pages showing use of external link.	
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
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. 3. 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)	CO1

	• Date of birth (3 select boxes) • Languages known (check boxes – English, Telugu, Hindi, Tamil) • Address (text area)	
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. 2) 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
54	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.	CO2

	2. Update Student table add following attributes (Course, Roll No).	
65	1. Write a program to execute all DDL query. 2. Write a program to execute all DML query. 3. 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.	C05
83	A Servlet program that connects to a database and retrieves data.	C05
84	Create Servlet Http Session Login and Logout page.	C05
85	Create a web form which process servlet and demonstrate use of cookies and sessions.	C05
86	A program to print hello world using JSP.	C05
87	Creating JSP in Eclipse IDE with Tomcat server	C05
88	Write a program to print username using JSP scriptlet tag.	C05
89	Write a program to prints current time using JSP expression tag.	C05
90	Write a program that declares method using JSP Declaration tag.	C05
91	Write a program to print the name of the user with message using JSP request implicit object.	C05
92	Write a program to redirect the response to the Google using JSP response implicit object	C05
93	Write a program to create an object to set, get or remove attribute or to get session information using session implicit object	C05
94	Write a program to implement various attribute of JSP page directive.	C05
95	Write a program to add any type of file using JSP include directive.	C05
96	Write a program to add tag in your file using JSP taglib directive.	C05
97	Write a program to create a custom tag that prints the current date and time in JSP.	C05
Required Software and Tools		
1. NetBeans 2. Eclipse IDLE		

Subject Name: Competitive Programming		L-T-P [0-0-2]
Subject Code: BMCA0356		
Course Objective: To develop students problem-solving skills, algorithmic thinking, and proficiency in coding by practicing diverse and challenging problems in competitive programming environments.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Utilize data structures and algorithms to efficiently solve diverse array and string programming challenges.	K3
CO2	Develop skills in linked list operations to solve complex data structure challenges efficiently	K3
CO3	Develop skills in advanced algorithms for solving diverse challenges involving trees and graphs efficiently.	K3
CO4	Develop skills in dynamic programming to efficiently solve complex optimization problems and challenges.	K3
CO5	Apply techniques in solving complex backtracking and combinatorial problems across diverse algorithmic scenarios efficiently.	K3
List of Practical		
Sr No	Program Title	CO Mapping
1	Find the largest sum contiguous subarray (Kadane's Algorithm).	CO1
2	Rotate an array by k steps.	CO1

3	Find the intersection of two arrays.	CO1
4	Remove duplicates from a sorted array.	CO1
5	Find the longest common prefix among a set of strings.	CO1
6	Find the first non-repeating character in a string.	CO1
7	Check if a string is a valid palindrome.	CO1
8	Group anagrams together.	CO1
9	Implement strStr() (needle in a haystack).	CO1
10	Longest Substring Without Repeating Characters.	CO1
11	Find the maximum product subarray.	CO1
12	Find the majority element in an array.	CO1
13	Merge overlapping intervals.	CO1
14	Find all pairs in an array that sum up to a specific target.	CO1
15	Implement an algorithm to check if a string has all unique characters.	CO1
16	Find the minimum window substring.	CO1
17	Implement atoi (convert string to integer).	CO1
18	Multiply two large numbers represented as strings.	CO1
19	Find the longest palindromic substring.	CO1
20	Implement a function to find the median of two sorted arrays.	CO1
21	Reverse a linked list.	CO2
22	Detect a cycle in a linked list.	CO2

23	Merge two sorted linked lists.	CO2
24	Remove N-th node from the end of a linked list.	CO2
25	Find the intersection point of two linked lists.	CO2
26	Add two numbers represented by linked lists.	CO2
27	Flatten a multilevel doubly linked list.	CO2
28	Copy a linked list with random pointers.	CO2
29	Sort a linked list.	CO2
30	Swap nodes in pairs.	CO2
31	Partition a linked list around a value x.	CO2
32	Clone a linked list with next and random pointers.	CO2
33	Rotate a linked list.	CO2
34	Reverse nodes in k-group.	CO2
35	Find the middle of a linked list.	CO2
36	Flatten a linked list.	CO2
37	Remove duplicates from an unsorted linked list.	CO2
38	Implement a function to add two numbers without using arithmetic operators.	CO2
39	Convert a binary search tree to a sorted doubly linked list.	CO2
40	Check if a linked list is a palindrome.	CO2
41	Invert a binary tree.	CO3

42	Find the lowest common ancestor of a binary tree.	C03
43	Level order traversal of a binary tree.	C03
44	Check if a binary tree is balanced.	C03
45	Serialize and deserialize a binary tree.	C03
46	Check if two binary trees are identical.	C03
47	Find the maximum path sum in a binary tree.	C03
48	Implement a tree (prefix tree).	C03
49	Find the shortest path in a graph (Dijkstra's algorithm).	C03
50	Detect a cycle in a graph.	C03
51	Check if a binary tree is a binary search tree.	C03
52	Print all paths from the root to leaf nodes.	C03
53	Find the diameter of a binary tree.	C03
54	Construct a binary tree from preorder and in order traversal.	C03
55	Find the kth smallest element in a binary search tree.	C03
56	Implement an algorithm to check if a tree is symmetric.	C03
57	Find the deepest node in a binary tree.	C03
58	Implement a depth-first search (DFS) algorithm.	C03
59	Implement a breadth-first search (BFS) algorithm.	C03
60	Find all bridges in a graph (Tarjan's algorithm).	C03

61	Climbing Stairs problem.	CO4
62	Longest Increasing Subsequence.	CO4
63	0/1 Knapsack problem.	CO4
64	Coin Change problem.	CO4
65	Longest Common Subsequence.	CO4
66	Minimum Path Sum in a grid.	CO4
67	Edit Distance (Levenshtein distance).	CO4
68	House Robber problem.	CO4
69	Maximum Product Subarray.	CO4
70	Palindromic Substrings.	CO4
71	Longest Palindromic Subsequence.	CO4
72	Partition Equal Subset Sum.	CO4
73	Best Time to Buy and Sell Stock with Cooldown.	CO4
74	Word Break problem.	CO4
75	Maximum Sum of 3 Non-Overlapping Subarrays.	CO4
76	Count of Subset Sum problem.	CO4
77	Maximum Length of Repeated Subarray.	CO4
78	Minimum Cost to Merge Stones.	CO4
79	Decode Ways.	CO4

80	Longest Arithmetic Subsequence.	CO4
81	Solve the N-Queens problem.	CO5
82	Generate all subsets of a set.	CO5
83	Word Search problem.	CO5
84	Sudoku Solver.	CO5
85	Permutations of a string or array.	CO5
86	Combination Sum problem.	CO5
87	Generate Parentheses.	CO5
88	Rat in a Maze problem.	CO5
89	Hamiltonian Path problem.	CO5
90	Subset Sum problem.	CO5
91	Solve the Word Ladder problem.	CO5
92	Find all possible combinations of k numbers that add up to n.	CO5
93	Lexicographical permutations of a string.	CO5
94	Find all unique combinations of numbers that sum up to a target.	CO5
95	Implement a function to solve the Knight's Tour problem.	CO5
96	Find all possible solutions for the m-coloring problem.	CO5
97	Generate all permutations of a string or array with duplicates.	CO5
98	Implement an algorithm for the Eight Queens puzzle.	CO5

99	Solve the Cryptarithmic puzzle.	CO5
100	Find the Kth permutation sequence.	CO5
Required Software and Tools		
1. Jupyter 2. Eclipse IDE 3. Turbo C++		

Subject Name: Cloud Computing Lab		L-T-P [0-0-2]
Subject Code: BMCA0351		
Course Objective: 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 Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Discuss about the use AWS management console, create, and manipulate Amazon instances.	K2
CO2	Discuss the encrypting and controlling of S3.	K2
CO3	Describe how to create private and virtual private cloud.	K2
CO4	Create IAM group in cloud.	K3
CO5	Discuss the steps of Installation of Open Stack.	K2
List of Practical		
Sr No	Program Title	CO Mapping
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
Required Software and Tools		
1. AWS 2. Google Cloud		

Subject Name: Computer Network Lab		L-T-P [0-0-4]
Subject Code: BMCA0352		
Course Objective: 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 Outcomes (CO)		
Course outcome: After completion of this course students 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	K1
CO2	Implement any topology using network devices	K3
CO3	Analyze performance of various communication protocols	K3
CO4	Discuss TCP/IP configuration for Windows and Linux	K2
CO5	Demonstrate the major software and hardware technologies used on computer networks	K3
List of Practical		
Sr No	Program Title	CO Mapping
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.	C01
26	Implement VLAN access control policies and verify their effects.	C02
27	Write simple Python scripts to automate network configurations.	C04
28	Use Ansible to automate device configuration tasks.	C05
29	Set up SNMP for monitoring network devices.	C03
30	Set up and verify IPSec VPN connections between routers.	C02
31	Configure RSTP or MSTP, and test failover scenarios.	C03
32	Configure OSPF for multiple areas, verify route propagation.	C03
33	Configure basic BGP between routers, verify and troubleshoot BGP peering.	C03
34	Configure route redistribution between different routing protocols.	C03
35	Implement basic QoS policies on a router or switch.	C05
36	Configure basic MPLS settings, verify MPLS forwarding.	C03
37	Set up GRE tunnels between routers, test and verify tunnel connectivity.	C03
38	Configure and verify DMVPN in a hub and spoke topology.	C03
39	Configure VRRP or HSRP for gateway redundancy.	C03
40	Set up and test IP SLA for monitoring and troubleshooting	C05
41	Create a network design diagram using tools like Cisco Packet Tracer or GNS3.	C05
42	Configure redundant links and devices, test failover scenarios.	C05
43	Plan and design a wireless network for an office environment.	C05
44	Use structured methodologies (e.g., OSI model approach) to troubleshoot network issues.	C02
45	Use Wireshark to capture and analyze network traffic.	C05

46	Set up SNMP monitoring on network devices, use SNMP tools to gather information.	C03
47	Resolve VLAN related issues based on a provided network scenario.	C02
48	Troubleshoot and resolve issues with routing protocols (e.g., OSPF, EIGRP).	C03
49	Design and implement a network with redundant paths and devices.	C05
50	Diagnose and resolve common wireless network problems.	C05
Required Software and Tools		
1. Packet Tracer v8		

Subject Name: Software Engineering in Mini Project Lab		L-T-P [0-0-4]
Subject Code: BMCA0359		
Course Objective: 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 Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Discuss ambiguities, inconsistencies, and incompleteness from requirement a requirements specification and state functional and non-functional.	K3
CO2	Explain different actors and use cases from a given problem statement and design use case diagram to associate use cases with different types of relationship	K4
CO3	Design structural diagrams, behavioral diagram, interaction diagram for software	K4
CO4	Demonstrate the modern tools for testing	K3
CO5	Demonstrate the modern engineering tools for project management	K6
List of Practicals		
Sr No	Program Title	CO Mapping
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
Required Software and Tools		
1. StarUML 2. DRAWio		
Subject Code: CRM Advance Administration Lab		L-T-P [0-0-4]
Subject Code: BMCA0311P		
Course Objective: Fundamental Knowledge of CRM and Problem-Solving Skills.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Describe cloud applications.	K2
CO2	Implement how to Set up Salesforce, Case Escalation and Entitlements.	K3

C03	Use data management tools.	K3
C04	Apply the concepts of reports design.	K3
C05	Apply Dashboards and Report Charts on Lightning Pages.	K3

List of Practical

Sr No	Program Title	CO Mapping
1	Cloud Applications	C01
2	Set Up Salesforce Knowledge	C02
3	Set Up Case Escalation and Entitlements	C02
4	Import and Export with Data Management Tools	C03
5	Setup Case Escalation and Entitlements Improve Data Quality for a Recruiting App	C03
6	Improve Data Quality for Your Sales and Support Teams	C03
7	Evaluate Report Data with Formulas	C04
8	Embed Dashboards and Report Charts on Lightning Pages	C05

Required Software and Tools

1. Trailhead
2. Zendesk

Subject Name: Advance Concepts of Optimization Lab		L-T-P [0-0-4]
Subject Code: BMCA0312P		
Course Objective: To introduce students 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 Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Implement Off Page SEO technique.	K3
CO2	Implement Off Page for creating Backlink.	K3
CO3	Explain Local SEO and its ranking factors.	K2
CO4	Implement YouTube SEO for keyword research, uploading videos and its ranking factors.	K3
CO5	Implement key elements of SEO Audit.	K3
List of Practical		
Sr No	Program Title	CO Mapping
1	Off Page Part 1 a. Backlinks Explanation and Creation	CO1

	b. Link Quality, Link Juice c. Do follow & No follow d. Anchor Text and its types	
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 d. Citation	CO3
4	YouTube SEO a. YouTube Ranking factor b. YouTube Keyword Research c. How to Upload videos on YouTube? d. How to optimized videos on YouTube	CO4
5	Audit & Strategy a. Key Elements in SEO Audit Report b. Auditing Software's c. Audit Report Presentation d. Phase- 1 and Phase -2 SEO Auditing Strategy	CO5
Required Software and Tools		
Website:- Keyword Planner		

Subject Name: Advance Concepts of Analytics Lab		L-T-P [0-0-4]
Subject Code: BMCA0313P		
Course Objective: 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 Outcomes (CO)		
Course outcome: After completion of this course students 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 query based on data managing relationship.	K5
CO5	Demonstrate with concepts of PowerBI.	K3
List of Practical		
Sr No	Program Title	CO Mapping
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 PowerBI.	C05
Required Software and Tools		
1. PowerBI 2. Jupyter 3. Ms Excel		

Subject Name: Advance Software Testing Lab		L-T-P [0-0-4]
Subject Code: BMCA0314P		
Course Objective: Learn test plan documentation. Understanding web testing tool, implement bug tracking tool, test management tool		
Course Outcomes (CO)		
Course outcome: After completion of this course students 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.	K3
CO2	Create a program and give the reason for failure.	K3
CO3	Identify system specification and report bugs.	K1
CO4	Design Test case of any application.	K3
CO5	Analyze and implementation of web testing tool, bug tracking tool, test management tool, open source-testing tool.	K4
List of Practical		

Sr No	Program Title	CO Mapping
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
Required Software and Tools		
1. MS EXCEL 2. TURBOC++ 3. Jupyter 4. Eclipse		

Subject Name: ROBOTIC PROCESS AUTOMATION				L-T-P [3-1-0]		
Subject Code: BMCA0401				Applicable in Department: MCA		
Pre-requisite of Subject: Basic computer skills, fundamental programming knowledge and problem-solving skills.						
Course Objective: This course aims to provide a comprehensive understanding of Robotic Process Automation (RPA), covering its basics, tools, advanced concepts, and techniques, as well as practical deployment and maintenance.						
Course Outcomes (CO)						
Course outcome: After completion of this course students will be able to:					Bloom’s Knowledge Level(KL)	
CO1	Implement and manage RPA solutions across various industries, addressing real-world challenges and opportunities.					K3
CO2	Design and implement efficient automation workflows tailored to specific business needs.					K3
CO3	Implement data scraping, selector customization, Citrix automation, and Excel/PDF data manipulation.					K3
CO4	Implement effective debugging techniques, and handle exceptions to ensure robust and responsive automation solutions.					K3
CO5	Manage and deploy automation bots using a server, including publishing, updating, and managing packages.					K3
	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
1 Introduction	Introduction to	Scope and techniques of automation, Robotic process automation, what can RPA do? Benefits of RPA, Components of	Lectures, PPTs and	8L + 4P	Assignment/Experiment 1	CO1

to Robotic Process Automation	Robotic Process Automation	RPA, RPA platforms, The future of automation. History of Automation , What is RPA , RPA vs Automation, Processes & Flowcharts , Programming Constructs in RPA , What Processes can be Automated , Types of Bots , Workloads which can be automated , RPA Advanced Concepts , Standardization of processes , RPA Development methodologies , Difference from SDLC , Robotic control flow architecture , RPA business case , RPA Team , Process Design Document/Solution Design Document , Industries best suited for RPA , Risks & Challenges with RPA , RPA and emerging ecosystem.	Notes			
2 RPA Tool Introduction and Basics	RPA Tool Introduction and Basics	The User Interface , Variables , Managing Variables , Naming Best Practices , The Variables Panel , Generic Value Variables , Text Variables , True or False Variables , Number Variables , Array Variables , Date and Time Variables , Data Table Variables , Managing Arguments , Naming Best Practices , The Arguments Panel , Using Arguments , About Imported Namespaces , Importing New Namespaces, Control Flow , Control Flow Introduction , If Else Statements , Loops , Advanced Control Flow , Sequences , Flowcharts , About Control Flow , Control Flow Activities , The Assign Activity , The Delay Activity , The Do While Activity , The If Activity , The Switch Activity , The While Activity , The For Each Activity , The Break Activity , Data Manipulation , Data Manipulation Introduction, Scalar variables, collections, and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (2,3)	CO2
3 Advanced Automation Concepts & Techniques	Concepts of Advanced Automation	Recording Introduction, Basic and Desktop Recording, Web Recording, Input/Output Methods, Screen Scraping, Data Scraping, scraping advanced techniques, Selectors, Defining and Assessing Selectors, Customization, Debugging , Dynamic Selectors , Partial Selectors , RPA Challenge , Image, Text & Advanced Citrix Automation , Introduction to Image & Text	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (4-14)	CO3

		Automation , Image based automation , Keyboard based automation , Information Retrieval , Advanced Citrix Automation challenges , Best Practices , Using tab for Images , Starting Apps , Excel Data Tables & PDF , Data Tables in RPA , Excel and Data Table basics , Data Manipulation in excel – Extracting Information Technology Data from PDF , Extracting a single piece of data , Anchors , Using anchors in PDF				
4 Handling User Events & Assistant BOTS, Exception Handling	Managin g Assistant Bots	what are assistant bots? Monitoring system event triggers, Hotkey trigger, Mouse trigger, System trigger, monitoring image and element triggers, an example of monitoring email, Example of monitoring a copying event and blocking it, Launching an assistant bot on a keyboard event.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (15,16)	CO4
	Exception n handling	Debugging and Exception Handling, Debugging Tools, Strategies for solving issues, Catching errors.				
5 Deploying and Maintaining the BOT	Bot Mainten ance	Publishing using publish utility, Creation of Server, Using Server to control the bots, creating a provision Robot from the Server, connecting a Robot to Server, Deploy the Robot to Server, Publishing and managing updates, managing packages, Uploading packages, Deleting packages.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (17-26)	CO5
Total				40L + 20P		

Textbooks

Sr No	Book Details
1	Alok Mani Tripathi, “Learning Robotic Process Automation”, Packt Publishing, 2018.
2	Tom Taulli: The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems Springer India; 1st edition (31 December 2021)

Reference Books:**Reference Books****Sr No****Book Details****1**Frank Casale, Rebecca Dilla, Heidi Jaynes, Lauren Livingston, "Introduction to Robotic Process Automation: a Primer", Institute of Robotic Process Automation, 1st Edition 2015.**2**Richard Murdoch, Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant", Independently Published, 1st Edition 2018.**Links****Unit 1:** https://www.youtube.com/watch?v=MBI-3Yb30FA&list=PL9ooVrP1hQOEeFvW5KaSea6mrIEU6TZ9s&ab_channel=edureka%21**Unit 2:** https://www.youtube.com/watch?v=n6nxTBB16ag&list=PL9ooVrP1hQOEeFvW5KaSea6mrIEU6TZ9s&index=2&ab_channel=edureka%21**Unit 3:** https://www.youtube.com/watch?v=p2SFDD9ViHg&list=PL9ooVrP1hQOEeFvW5KaSea6mrIEU6TZ9s&index=46&ab_channel=edureka%21**Unit 4:** https://www.youtube.com/watch?v=A6FzMO73vdc&list=PL9ooVrP1hQOEeFvW5KaSea6mrIEU6TZ9s&index=47&ab_channel=edureka%21**Unit 5:** https://www.youtube.com/watch?v=JMEZJOMGa-A&list=PL9ooVrP1hQOEeFvW5KaSea6mrIEU6TZ9s&index=41&ab_channel=edureka%21

Subject Name: Administering Cloud and App using Sales force						L-T-P [3-0-0]
Subject Code: BMCA0411				Applicable in Department: MCA		
Pre-requisite of Subject: Creative thinking which is being used in your business areas.						
Course Objective: Understand the concepts of cloud and will be able to learn the concepts of administration. They will also be able to understand and implement the concepts of lightning experience in context to Sales force.						
Course Outcomes (CO)						
Course outcome: After completion of this course students will be able to:						Bloom’s Knowledge Level(KL)
CO1	Discuss basic working environment of Salesforce.					K2
CO2	Describe the concepts of Lightning & Salesforce App Experience Customization.					K2
CO3	Recognize with concepts reports chatter administration.					K1
CO4	Discuss the concepts of Lightning Experience.					K2
CO5	Implement Admin Essentials in Lightning Experience.					K3
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I Introduction to Cloud	Introduction to Cloud	Marketing Cloud Admin Certification Prep: Setup and Data, Marketing Cloud Admin Certification Prep: Marketing, Channels, and Maintenance.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment 1	CO1

II Lightning & Sales force App Experience Customization	Lightning & Sales force App Experience Customization	Lightning Experience Customization, Service Cloud for Lightning Experience, App Exchange Solutions, Data Security, Identity Basics, Security Specialist.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment 2	CO2
III Sales force Administration	Sales force Administration	Reports & Dashboards for Lightning Experience, Create Reports and Dashboards for Sales and Marketing Managers, Lightning Experience Reports & Dashboards Specialist	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment (3,4)	CO3
IV Lightning Experience	Lightning Experience	Sales force Mobile App Customization, Chatter Administration for Lightning Experience, Leads & Opportunities for Lightning Experience, Pick list Administration, Duplicate Management, Formula Operators and Functions, Sales force Flow, Screen Flow Distribution, Lightning Experience Productivity.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment 5	CO4
V Learn Admin Essentials in Lightning Experience	Learn Admin Essentials in Lightning Experience	Application Lifecycle and Development Models, Change Set Development Model, Org Development Model, Package Development Model.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment (6,7)	CO5
Total				40L + 20P		
Textbooks						
Sr No	Book Details					

1	Alok Kumar Rai: Customer Relationship Management: Concepts and Cases (Second Edition), PHI Learning, 2018.
2	Bhasin," Customer Relationship Management", (Wiley Dreamtech) ,2019.

Reference Books:

Reference Books	
Sr No	Book Details
1	"Salesforce for beginners", Shaarif Sahaalane book by Amazon (Online edition).
2	"Learning Salesforce Development with Apex: Write, Run and Deploy Apex Code with Ease", Paul Battisson ,10 August 2020
Links	
Unit 1: https://www.youtube.com/watch?v=bxtqhfyoTjY&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=1 Unit 2: https://www.youtube.com/watch?v=ZkQwm-6lslw&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=3 Unit 3: https://www.youtube.com/watch?v=65QivvdfjGs&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=5 Unit 4: https://www.youtube.com/watch?v=65QivvdfjGs&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=6 Unit 5: https://www.youtube.com/watch?v=65QivvdfjGs&list=PLaGX-30v1lh1BaUKgXa05gqrOP0vUg_6i&index=8	

Subject Name: Search Engine Optimization				L-T-P [3-0-0]		
Subject Code: BMCA0412				Applicable in Department: MCA		
Pre-requisite of Subject: Basic Marketing Concepts and Knowledge of Computers.						
Course Objective: To introduce students how digital marketing have disrupted the way businesses sell and purchase to consumers. To help students to Recognize how marketers use the Google SEO Projects to influence purchase decisions on digital platforms using digital content and tools. To help students to Appreciate the benefits of integrating traditional and digital marketing with the Google SEO of selling and purchasing marketing strategies. To Identify the benefits of search to a business of using social media to engage an audience.						
Course Outcomes (CO)						
Course outcome: After completion of this course students will be able to:						Bloom's Knowledge Level(KL)
CO1	Describe importance of digital marketing.					K2
CO2	Reorganize how marketers use Google SEO projects to influence purchasing and selling decisions on digital platforms using digital content and tools.					K2
CO3	Analyze the benefits of integrating traditional and digital marketing with Google SEO for sells and purchasing marketing strategies.					K3
CO4	Evaluate the benefits of search advertising for a business that uses social media to target an audience.					K2
CO5	Implement an active social media community by using social media advertising.					K3
Syllabus						
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping
I Introducti on to Digital Marketing	Introducti on to Digital Marketing	Fundamentals of Marketing: Journey from Traditional Marketing to Digital Marketing, Digital Marketing Metrics and Channels, Customer Centricity, Designing a Web Presence, Social Media Marketing, Search Engine Optimization (SEO), Search Engine Marketing (SEM), Content Marketing, User Nurturing	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment (1,2)	CO1
II Google Capstone	Google Capstone SEO	Getting Started and Milestone 1: Gauging a Site's Opportunity for Improvement, identifying a Potential Client, Resources, Create an	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment 3	CO2

SEO Project I	Project I	SEO Pitch, Resources, Develop Kickoff Questions, Resources Milestone 2: Initial Research Phase, developing a Persona – Resources, User/Buyer Persona Template, Performing Keyword Research, Resources, Keyword Research Example & Template, Conducting a Competitive Analysis – Resources, Keyword Competitive Analysis Template				
III Google Capstone SEO Project II	Google Capstone SEO Project II	Milestone 3: Conducting a Content Audit and Technical Review, Competitive Content Analysis, Competitive Analysis Template, Internal Content Audit, Resources, Internal Content Audit Template, Keyword Mapping, Resources, Keyword Mapping Template, Technical SEO, Resources, Error Tracking Template, Technical Audit Template.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment (4,5)	CO3
IV Search Advertising	Search Advertising	Search Basics: Search, Intent, Market, the Bidding Process ,Google Adwards: Pros and Cons, Google's Take on Auction Ads: Payment Models, Pre-campaign Budgeting, Google's Take on Bidding, Audiences, and Tools: Basic Campaign Setup, Targeting, Budgeting, Timing, and Rotation, Google Ads Campaigns: Keyword Optimization, Optimizing Ad Copy, Negative Keywords.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment 6	CO4
V Social Media Advertising	Social Media Advertising	Case Study: City Shopping Center, Objectives, PPC Hero , Pros and Cons of Top Social Media Advertising Platforms, Facebook: Payment Models and Ad Elements, Introduction to Facebook Ads Manager. Instagram: Who Advertises on Instagram, Instagram Ad Features, Twitter: Ad Types, Campaign Types, Creative Best Practices, Ads Manager, Tweet Analytics and Customer Insights.	Lectures, PPTs and Notes	8L +4P	Assignment/Experiment (7,8)	CO5
Total				40L +20P		
Textbooks						
Sr No	Book Details					

1	Digital Marketing for Dummies, Author: Ryan Deiss& Russ Henneberry, Publisher: John Wiley & Sons, Inc.
2	Youtility, Author: Jay Baer, Publisher: Gildan Media, LLC.
3	Epic Content Marketing, Author: Joe Pulizzi, Publication: McGraw Hill Education.

Reference Books:

Reference Books	
Sr No	Book Details
1	The Art of SEO: Mastering Search Engine Optimization, Fourth Edition (Grayscale Indian Edition) Paperback – 30 September 2023 by Eric Enge (Author), Stephan Spencer (Author), Jessie Stricchiola (Author)
2	Product-Led SEO: The Why Behind Building Your Organic Growth Strategy Paperback – 27 April 2021 by Eli Schwartz (Author)
Links	
Unit 1: https://www.youtube.com/watch?v=XO6MSb9-s1k Unit 2: https://www.youtube.com/watch?v=FGF8RusTIQ0 Unit 3: https://www.youtube.com/watch?v=R8tator_HI0 Unit 4: https://www.youtube.com/watch?v=8jeOKv5UOa0 Unit 5: https://www.youtube.com/watch?v=EmQf1J29Z58	

Subject Name: Business Data Analytics					L-T-P [3-0-0]		
Subject Code: BMCA0413					Applicable in Department: MCA		
Pre-requisite of Subject: Basic knowledge of data analytics.							
Course Objective: Students will be able to perform data analysis using Python programming. They will also be able to generate and analysis the reports using Python programming.							
Course Outcomes (CO)							
Course outcome: After completion of this course students will be able to:						Bloom's Knowledge Level(KL)	
CO1	Discuss the fundamentals of data analytics in a business context.						K2
CO2	Develop proficiency in data manipulation and analysis using Python.						K3
CO3	Analyse real-world business datasets and derive actionable insights.						K4
CO4	Develop skills to collect, clean, and pre- process data for analysis.						K3
CO5	Create effective data visualizations to communicate insights.						K3
Syllabus							
Unit No	Module Name	Topic covered	Pedagogy	Lecture Required (L+P)	Practical/ Assignment/ Lab Nos	CO Mapping	
I Foundation of Data Analytics	Foundati on of Data Analytics	Introduction: Evolution, Concept and Scopes, Data, Big Data, Metrics and Data classification, Data Reliability & Validity, Problem Solving with Analytics, Different phases of Analytics in the business and Data science domain, Descriptive Analytics, Predictive Analytics and Prescriptive Analytics, Different	Lectures, PPTs and Notes	8L + 4P	Assignment/Exper iment (1-4)	CO1	

		Applications of Analytics in Business, Text Analytics and Web Analytics, Skills for Business Analytics.				
II Descriptive Analytics	Descriptive Analytics	Describing and summarizing data sets, measures of central tendency, dispersion, skewness, kurtosis, Correlation. Inferential Statistics: Sampling & Confidence Interval, Inference & Significance. Estimation and Hypothesis Testing, Goodness of fit, Test of Independence, Permutations and Randomization Test, test/z, test (one sample, independent, paired), ANOVA, chi-square.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (5-8)	CO2
III Data Pre-Processing and Cleaning	Data Pre-Processing and Cleaning	Data manipulation steps (sorting, filtering, duplicates, merging, appending, sub-setting, derived variables, data type conversions, renaming, formatting, etc.), normalizing data, sampling, missing value treatment, outliers. Exploratory data analysis: Data visualization using matplotlib, seaborn libraries, creating graphs (bar/line/pie/boxplot/histogram, etc.), summarizing data, descriptive statistics, univariate analysis (distribution of data), bivariate analysis (cross tabs, distributions and relationships, graphical analysis).	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (9-14)	CO3
IV Machine Learning	Machine Learning	Introduction, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning. Supervised Machine Learning: Linear Regression, Multiple Linear Regression Polynomial Regression.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (15,16)	CO4
V Classification Techniques	Classification Techniques	Using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one variable and with multiple variables, Classification using K-NN, Naive Bayes classifier, Random Forest, Support Vector Machines.	Lectures, PPTs and Notes	8L + 4P	Assignment/Experiment (17)	CO5
Total				40L + 20P		
Textbooks						

Sr No	Book Details	
1.	Kumar, U.D.: Business Analytics – The Science of Data – Driven Decision Making, Wiley	
2	Gert H.N. Thorlund, I. and Thorlund, I.: Business Analytics for Managers – Taking Business Intelligence Beyond Reporting, Wiley	
Subject Name: Software Quality and Testing		L-T-P [3-0-0]
3	Johnson, R.A., Miller, I. and Freund, J.: Probability and Statistics for Engineers, Pearson.	
Subject Code: BMCA0414		Applicable in Department: MCA
Pre-requisite of Subject: Basic knowledge about software and knowledge of any programming language.		
Reference Books:		
Course Objective: Student will be able to analyse the test needs for a system to plan test activities and work products that will achieve the test objectives. Use traceability to check completeness and consistency of defined test conditions with respect to the test objectives, test strategy, and test plan Explain the importance of accurate and timely information collection during the test process to support accurate reporting and evaluation against exit criteria.		
Sr No	Book Details	
Course Outcomes (CO)		
1	Posey, J. and Layman, R.: Introduction to Computing & Problem Solving with Python, Khanna Publishers.	
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level(KL)
2	Bowles, M.: Machine Learning in Python – Essential Techniques for Predictive Analysis, Wiley.	
CO1	Explain test process by monitoring, planning, controlling, designing, implementing and execution	K2
CO2	Describe various test managing approaches like experience, based testing, risk based testing and other technique for test selection	K1
CO3	Unit 1: https://onlinecourses.nptel.ac.in/noc21_cs45/preview Explain various management reviews and audit by matrices and formal reviews	K2
CO4	Unit 2: https://www.youtube.com/watch?v=ZTJczg8leo0 Describe defect management by using defect workflow, duplicate defect report, cross functional defect management and defect report information	K2
CO5	Unit 3: https://www.youtube.com/watch?v=ZTJczg8leo0 Unit 4: https://www.youtube.com/watch?v=b7DdJbR6CU Compare and contrast various testing tools for manual and automation testing	K2
Syllabus		

[illegible]

Sr No	Book Details
1	Bret Pettichord, Cem Kaner, and James Marcus Bach1 "Lessons Learned in Software Testing", 1 st Edition 2002
2	Dorothy Graham and Erik P.W.M. Veenendaal "Foundations of Software Testing: ISTQB Certification" engage Publications, 3 rd 2017

Reference Books:

Reference Books	
Sr No	Book Details
1	"Software Quality and Testing ", (English, Paperback, Kelkar S. A.), January 2012
2	"Software Testing and Quality Assurance: Theory and Practice ", Kshirasagar Naik, Priyadarshi Tripathy , Wiley, September 2011

Links	
Unit 1:	https://www.youtube.com/watch?v=RtMcWvHu9Zg&t=373s
Unit 2:	https://www.youtube.com/watch?v=PPsRIS4YWqQ
Unit 3:	https://www.youtube.com/watch?v=7VMSw4A6kck
Unit 4:	https://www.youtube.com/watch?v=sxG7vw4xvGc
Unit 5:	https://www.youtube.com/watch?v=BtpmMR4GeF8

Subject Name: Robotic Process Automation Lab		L-T-P [0-0-4]
Subject Code: BMCA0451		
Course Objective: To equip students with practical skills in designing, developing, and deploying RPA solutions, focusing on automating business processes using industry-standard RPA tools and technologies.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Apply concepts and methods of RPA.	K3
CO2	Implement control flow structures in programming languages, specifically focusing on decision-making and iteration constructs.	K3
CO3	Apply the knowledge of RPA tools, functions in various industries and perform, control various tasks using RPA bots.	K3
CO4	Demonstrate and build a structured business automation process.	K3
CO5	Develop a real-world workflow automation project and skills in debugging a workflow.	K3
List of Practicals		
Sr No	Program Title	CO Mapping
1	Download, Install and Activate Ui-Path Studio. Learn all the basics of RPA (Variables, arguments, and Control flow etc.)	CO1
2	Write a program to perform if-activity, switch- activity. (Suggested Hint: Find the smallest and biggest numbers in an array.)	CO2
3	(Write a program to perform while activity, do-while activity, for-each activity. (Suggested Hint: how an integer variable will increase from 5 to 50 in increments of 5.)	CO2

4	Write a program to perform Flowchart and Sequence activity on Scalar variables.	CO3
5	Write a program to perform Flowchart and Sequence activity on Collection variables.	CO3
6	Write a program to i)build a data table(static) ii) build a data table using data scraping (Dynamically)	CO3
7	Write a program to create a simple calculator using a separate workflow and arguments	CO3
8	Write a program for clipboard management. (Suggested Hint: open Notepad, write some data into it, and then copy the data to the clipboard. Later extract the data from the clipboard)	CO3
9	Write a program for clipboard management. i)Read cell ii)Write cell iii)Read range iv)Write range v)Append range	CO3
10	Write a program to implement Arithmetic operations in 2 Excel files.	CO3
11	Write a program to read an Excel file and creating a data table by using data from the Excel file	CO3
12	Write a program for acting on controls using mouse and keyboard activities.	CO3
13	Write a program for screen scraping using OCR.	CO3
14	Write a program to extract Email Address.	CO3
15	Find Unicorn name Generators.	CO4
16	Find Movie Rating.	CO4
17	Implement Amazon Data Scraping.	CO5

18	Email Automation.	C05
19	Supplier Management System.	C05
20	Transferring Data from one system to another.	C05
21	Password Generator.	C05
22	Forms Processing	C05
23	Connecting Robot to Orchestrator	C05
24	Extracting data from PDFs, scanned documents, and other formats	C05
25	Generating mass emails	C05
26	Write a program to (i) empty the trash folder in Gmail (ii) empty the Recycle Bin	C05
Required Software and Tools		
1. UiPath 2. Automation Anywhere		

Subject Name: Administering cloud and App using Salesforce Lab		L-T-P [0-0-4]
Subject Code: BMCA0411P		
Course Objective: Student will be able to understand the cloud architecture and working. He will be able to learn the working process of salesforce app.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Demonstrate your knowledge of automation, enhancement, and troubleshooting for approval processes.	K3
CO2	Create the Space Station Construction app	K3
CO3	Identify process automation tools and strategies and the steps of a successful sales process.	K2
CO4	Identify the use of Flow Builder to capture and update contact information with a flow.	K2
CO5	Create a report to visualize your Opportunities and identify the important to customize the mobile app	K3
List of Practical		
Sr No	Program Title	CO Mapping
1	Process Automation Specialist	CO1
2	Build a Battle Station App	CO2
3	App Customization Specialist	CO3
4	Quick start process builder	CO3
5	Build a simple salesforce flow	CO4

6	Create a report with help of tools	CO5
7	Customize a Salesforce Mobile App	CO5
Required Software and Tools		
1. Trailhead 2. Zendesk		

Subject Name: Search Engine Optimization Lab	L-T-P [0-0-4]
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Subject Code: BMCA0412P

Course Objective: Students will be able to understand how search engine optimization and social media have used the way businesses sell to consumers It will help students to Recognize how marketers use the Advanced Content and Tactics to influence purchase and sell decisions on digital platforms using SEO content and tools.

Course Outcomes (CO)

Course outcome: After completion of this course students will be able to:

**Bloom's
Knowledge Level
(KL)**

CO1	Develop Persona of any Company.	K3
CO2	Create Detailed Audit report of any Website.	K4
CO3	Create Keyword mapping.	K3
CO4	Implement Keyword research in all types of search intent.	K3
CO5	Implement Keyword research for Google Ad campaign in web development services	K3

List of Practical

Sr No	Program Title	CO Mapping
1	Develop a Persona for a Digital Marketing agency.	CO1
2	Perform Keyword Research for a new fresh website of Digital Marketing according to Persona you developed previously?	CO1
3	Make a Detailed audit Report for any website in the Digital Marketing industry and List out Problems in the Website?	CO2
4	Write Content on “Why Keyword research is Important” and Create Keyword Mapping in this.	CO3

5	Take any Two Websites (the top one and the lower one) of the same industry and perform a Competitor Analysis between them.	CO3
6	List out all types of Search Intent and Perform Keyword Research in each search Intent Segment? Remember all the search Intent should belong to the same Industry.	CO4
7	Perform Keyword Research for Running a Google Ad campaign for a “Web development service” website.	CO5
8	Differentiate Search Ads and Display ads with an Example for Web develop.	CO5
Required Software and Tools		
Website: - Keyword Planner		

Subject Name: Business Data Analytics Lab	L-T-P [0-0-4]
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Subject Code: BMCA0413P		
Course Objective: Students will be able to perform data analysis using Python programming. They will also be able to generate and analysis the reports using Python programming.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Describe data distributions and detect patterns or anomalies.	K2
CO2	Recognize concepts such as hypothesis testing, correlation, and regression analysis.	K2
CO3	Implement basic machine learning algorithms using Python libraries like scikit-learn.	K3
CO4	Develop predictive models to forecast business metrics and outcomes.	K3
CO5	Apply model evaluation techniques and how to improve model performance.	K3
List of Practical		
Sr No	Program Title	CO Mapping
1	Write a Python script to calculate the sum of all elements in each list.	CO1
2	Create a NumPy array of shape (3, 4) with random integers between 1 and 10. Calculate the mean and standard deviation of the array.	CO1
3	Load the "sales_data.csv" dataset into a Pandas data frame. Perform data cleaning by handling missing values and duplicates.	CO1

4	Extract the "Product" column from the dataframe and display the unique values.	CO1
5	Calculate descriptive statistics for the "Revenue" column in the "sales_data.csv" dataframe.	CO2
6	Create a scatter plot to analyze the relationship between "Revenue" and "Units Sold" columns.	CO2
7	Group the "sales_data.csv" dataframe by "Product" and calculate the total revenue for each product.	CO2
8	Perform a pivot table operation to summarize the sales data by month and product.	CO2
9	Convert the "Date" column in the "sales_data.csv" dataframe to datetime format.	CO3
10	Create a time series plot to visualize the monthly revenue trends.	CO3
11	Split the "sales_data.csv" dataframe into training and testing sets.	CO3
12	Train a linear regression model to predict the "Revenue" based on other variables.	CO3
13	Implement a simple linear regression model using NumPy and apply it to a sample dataset.	CO3
14	Train a decision tree classifier using scikit-learn and visualize the resulting tree	CO3
15	Implement SVM for both classification and regression tasks using scikit-learn.	CO4
16	Implement K-Means clustering using scikit-learn and apply it to a sample dataset.	CO4
17	Compare the SVM and decision tree algorithms for compare the performance of the models on sample dataset.	CO5
Required Software and Tools		
1. Jupyter 2. Python IDLE		

Subject Name: Software Quality and Testing Lab		L-T-P [0-0-4]
Subject Code: BMCA0414P		
Course Objective: Students will be able to Design, develop and code a program and then derive test cases, Execute the test cases and draw out the result. They will be able to understand decision table approach, boundary value analysis and equivalence class partitioning.		
Course Outcomes (CO)		
Course outcome: After completion of this course students will be able to:		Bloom's Knowledge Level (KL)
CO1	Design, develop and code a program and then derive test cases.	K3
CO2	Execute the test cases and draw out the result.	K3
CO3	Implement decision table approach, boundary value analysis and equivalence class partitioning.	K3
CO4	Implement binary search algorithm and quick sort algorithm.	K3
CO5	Implement dataflow testing.	K3
List of Practical		
Sr No	Program Title	CO Mapping
1	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision, table approach, execute the test cases and discuss the results.	CO1
2	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary value analysis, execute the test cases and discuss the results.	CO2
3	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent	CO3

	an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases, and discuss the results	
4	Design, develop, code, and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases, and discuss the test results.	CO5
5	Design, develop, code, and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these tests and discuss the test results	CO3
6	Design, develop, code, and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results	CO4
7	Design, develop, code, and run the program in any suitable language to implement the quick sort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases, and discuss the test results	CO4
Required Software and Tools		
1. Jupyter /Python IDLE 2. NetBeans 3. Ms Excel		

