Programme Matrix: Master of Computer Applications-MCA [2019 Batch]

Kristu Jayanti College

AUTONOMOUS   Bengaluru

Reaccredited 'A' Grade by NAAC | Affiliated to Bengaluru North University

FACULTY OF SCIENCE

MCA

Programme Educational Objectives

PEO1: To impart conceptual and technical knowledge in the field of computer applications.

PEO2: To nurture analytical, logical, design and implementation skills for industrial, academic, research and entrepreneurial pursuit.

PEO3: To develop socially responsible IT communities with professional and ethical values.

Programme Outcome

After the successful completion of three year MCA Programme, the graduate will be able to:

PO1: Demonstrate professional skills for global employability and lifelong learning.

Programme Specific Outcomes

After the successful completion of three year MCA Programme, the graduate will be able to:

PSO1: Solve real time computational problems using analytical and logical skills to contribute towards organizational and societal development.

PSO2: Create software solutions in an interdisciplinary and multicultural global environment.

PSO3: Demonstrate professional ethics and the potential for independent research, industrial development and entrepreneurial ventures.

I Semester

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Course Type	Course Code	Course Title	Course Outcome
DSCC	MCA204A11	**Microprocessor and Microcontroller**	1. Illustrate the assembly language programs using 8086 microprocessor and 8051 microcontroller. 2. Design architecture and software for Traffic Light control, LED and LCD displays. 3. Construct efficient processor interfacing circuits.
DSCC	MCA204A12	**Concepts of Computing and Data Structures**	1. Develop C programs by using data types, variables and I/O statements. 2. Design programs using built-in, user-defined functions, arrays, strings, pointers, structures and files. 3. Explain data structure, linear and non-linear data structures and insert, delete, search and modify operations. 4. Develop programs in C for implementing stacks, queues, linked lists, trees and graphs data structures.
DSCC	MCA204A13	**Computer Oriented Numerical and Statistical Methods**	1. Using the Bisection method, Newton's method and Secant method. 2. Apply Numerical methods- Newton's and Lagrange's interpolation formula to perform interpolation and Trapezoidal and Simpson's formula for integration. 3. Analyze data statistically using measures of central tendency, dispersion, skewness, bi-variate correlation and simple linear regression techniques. 4. Use the classical approach of probability, addition, multiplication and Bayes theorem for computation of probability. 5. Illustrate tests of significance for single mean, single variance, difference of two means and variance.
DSCC	MCA204A14	**Operating Systems and Linux**	1. Categorize the system calls and operating system services. 2. Illustrate the functionalities of virtual machines and installation procedures. 3. Differentiate process and threads in the multi- tasking/user operating system and synchronization mechanisms. 4. Explain non-contiguous memory allocation methods using page replacement algorithms. 5. Estimate average turnaround, waiting time in scheduling algorithms and total head movements in disk scheduling. Algorithms.
DSCC	MCA204A15	**Relational Database Management Systems**	1. Explain the concepts of database, data modelling, components of relational database model, two-tier and three-tier database architectures. 2. Construct ER diagram for company database, banking application, payroll processing, and student database. 3. Design the database satisfying the first, second and third normal forms. 4. Illustrate the SQL statements for data definition, modification, and retrieval of data. 5. Compose serial transactions satisfying conflict and view serializability.
DSCL	MCA2L2A11	**Microcontroller Practical**	1. Formulate basic arithmetic & logic programming solutions using PC as input output interface. 2. Execute programs using C programming language for Peripherals and Interfacing.

DSCL	MCA2L2A12	**C and Data Structures Practical**	1. Execute programs using C programming language.
			2. Formulate programming solutions using C programming language making use of conditional, looping statements, built-in and user defined functions, pointers, strings, structures and files
SEC	MSE4L2A11	**Soft Skills**	1. Explain the metaphors used to develop their social work-life and personal skills for emotional well-being
			2. Interpret the verbal and non-verbal communication techniques
NCCC	MTC5S1A01	**Technical Community Presentations**	1. Prepare and make a presentation on a technical topic beyond the regular syllabus.

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II Semester

Course Type	Course Code	Course Title	Course Outcome
DSCC	MCA204A21	**Design and Analysis of Algorithms**	1. Explain the concepts of generic algorithms. 2. Analyze the performance of algorithms using asymptotic notations. 3. Summarize Brute-Force and Divide and Conquer sorting algorithms, Linear and Binary Search algorithms. 4. Apply dynamic programming concepts in algorithms. 5. Explain the backtracking and branch & bound methods.
DSCC	MCA204A22	**Object Oriented Programming with Java**	1. Describe Classes, Objects, Polymorphism, Encapsulation, Inheritance, Methods, Abstraction and Class Libraries. 2. Create Java programs using Interface, Packages, Files, Threads, and Exceptions. Execute applet programs using AWT controls. 3. Apply the concept of database connectivity using JDBC.
DSCC	MCA204A23	**Computer Networks**	1. Describe the hardware and software components of a network and its interrelations, functioning of layers and protocols of OSI reference model. 2. Illustrate parity check, multi parity check, LRC and CRC error detection techniques and Hamming code for error correction. 3. Formulate the solution for routing and congestion problems using routing algorithms. 4. Distinguish the functioning of TCP and UDP. 5. Explain the design issues of session layer, presentation layer and application layer.
DSCC	MCA204A24	**Software Engineering**	1. Explain Software, Software Engineering, Waterfall model, Prototyping model, Spiral model. 2. Design the software by implementing the basic design principles and methodologies. 3. Evaluate the quality of software engineering process and software product by adopting the concept of software quality assurance and controlling techniques. 4. Illustrate Agile methodologies for web application development. 5. Explain the Software Configuration Management Process on SCI and Version control.
DSCC	MCA204A25	**Accounting for IT Professionals**	1. Categorize the business transactions based on accounting principles to prepare financial statements. 2. Measure the costs associated with production, marketing and distribution. 3. Analyze the financial statement by using cash flow and fund flow tools that helps managers in the financial decision-making process. 4. Prepare accounting and financial report using accounting software and information databases.
DSCL	MCA2L2A21	**Algorithms Practical**	1. Develop sorting and searching algorithms for numeric data. 2. Perform sort, search and traversal operations on tree and graph. 3. Construct dynamic programming for solving knapsack and travelling salesman problems.

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DSCL		MCA2L2A22	Java Programming Practical	1. Execute OOP concepts using Java programming language. 2. Develop Java programs using strings, exceptions, threads, files, applets and JDBC.
SEC		MSE4L2A21	.NET Programming Practical	1. Design graphical user interface using multiple forms, modules, menus and .NET controls. 2. Manage connectivity between user interface and database.
[Any ONE to be opted]	NCCC	MIE5A1A01	Industry Exposure	1. Understand the most recent and relevant technologies in practice by the IT industry
	NCCC	MWK5A1A01	Workshop	1. Understand the most recent and relevant software tools and technologies

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III Semester

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DSCC	MCA204A31	**Web Technologies**	1. Explain WWW, DNS; web hosting, web publishing, search engines, ftp, and telnet and http protocols. 2. Create programs using HTML5 for web page designing. 3. Apply DOM structure model using jquery for web programming. 4. Create client/server web applications using Servlets, JSP and XML.
DSCC	MCA204A32	**Data Mining and Data Warehousing**	1. Sketch various data warehouse architectures. 2. Explain data mining principles and pre-processing techniques. 3. Apply classification and clustering algorithms on numeric dataset. 4. Distinguish web mining algorithms. 5. Illustrate spatial and temporal data mining techniques and applications.
DSCC	MCA204A33	**Information Security**	1. Identify the network active and passive attacks and threats. 2. Compare the symmetric and asymmetric cryptographic algorithms based on key and block size, number of rounds and keys. 3. Describe the security standards Kerbros and X.509. 4. Apply Electronic mail security algorithms for data and mail transfer, web and IP Security. 5. Explain the impact of malicious softwares, viruses, hackers, worms and the importance of firewalls.
DSCC	MCA204A34	**Object Oriented Analysis and Design using UML**	1. Choose the Unified Modelling Language notations for effective and efficient system design. 2. Create Object Oriented design for high-level and low-level architectural models using UML class, object, and sequence diagrams. 3. Formulate the implementation view of the system to release the physical system. 4. Illustrate dynamic aspects of a software intensive systems using use case, interaction and activity diagrams. 5. Apply State Chart Diagrams to model the behavioural aspects and runtime environment of complex software systems.
DSCL	MCA2L2A31	**Web Programming Practical**	1. Execute programs using HTML5 and jquery. 2. Create web applications using JSP and Servlet.
DSCP	MCA2P2A31	**Software Engineering Mini Project**	1. Develop projects for simple user requirements using waterfall, prototyping, spiral or agile development models. 2. Apply Software Engineering techniques, skills and modern computer engineering tools for developing projects.
SEC	MSE4L2A31	**Research Methodology**	1. Apply the research design process, scientific method, experimental design principles and sampling theory for research study 2. Infer statistical measures linear correlation, linear regression, t-test, f-test, paired t-test and anova for research study 3. Prepare research paper using latex documentation system 4. Write research papers using report layouts and mechanics

[Any ONE to be opted]	N C C C	MKT5S1A01	**Knowledge Transfer Sessions**	1. Enhance their skills in a specific domain, fine-tuning their expertise.
	N C C C	MSD5L1A01	**Software Development**	1. Apply the knowledge of software engineering, programming, databases, and networking. Develop a quality real-time software solution for in-house automated application requirements

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IV Semester

Course Type	Course Code	Course Title	Course Outcome
DSCC	MCA204A41	**Middleware Technologies**	1. Identify the importance of Software Architecture, Software defined components, J2EE and .Net Frameworks. 2. Apply Java Beans to code the event handling mechanism. 3. Analyse CORBA technologies using ORB and implement the middleware components. 4. Apply the concepts of COM and .Net Technologies to solve the component creation problems.
DSCC	MCA204A42	**Data Science and Big Data Analytics**	1. Summarize data visualization and different regression methods. 2. Apply basic data wrangling operations and different data mining algorithms using the tool R. 3. Infer Hadoop and various tools in its Framework 4. Relate different recommender systems.
DSCC	MCA204A43	**Artificial Intelligence and Expert Systems**	1. Demonstrate heuristic search techniques, best first search, mean end analysis, A*, AO*, min-max, and alpha-beta cutoff algorithms. 2. Illustrate list manipulations, functions, predicates, conditionals, input, output, logical variables, iteration, Recursion in LISP and PROLOG programming concepts. 3. Demonstrate predicate logic, resolution, natural deduction, non-monotonic reasoning, truth maintenance system, semantic nets, frames, scripts, conceptual dependency for knowledge representation techniques, architecture for neural networks and expert systems. 4. Recall robot architecture, Waltz algorithm, constraint satisfaction, trihedral and non-trihedral figures, pragmatic, syntactic and semantic analysis, RTN and ATN.
DSCL	MCA2L2A41	**Network Programming Practical**	1. Demonstrate CRC, Checksum error detection techniques, file transfer protocols and sliding window protocols. 2. Develop a chat application and client server communications. 3. Design HTTP client and peer to peer communication using UDP.
DSCP	MCA2P2A41	**Enterprise Computing Project**	1. Formulate the software requirements for enterprises. 2. Develop computer based systems for business and enterprises
Elective Courses [Any ONE from each	DSEC / MCAA04A41	**System Simulation**	1. Apply concepts related to modelling, identification and simulation. 2. Integrate systems using appropriate analytical, computational and application practices and procedures. 3. Analyse discrete event systems through the competent use of computer simulation methods and mathematical modelling techniques. 4. Evaluate overall accuracy of the results obtained from a simulation model. 5. Apply the results to resolve critical issues in a real-world business

group to be opted]			environment.
	D S E C	**MCAB04A4 1**	**Theory of Computation**	1. Design DFA, NFA, regular expressions, alphabets, symbols and language for formal automata. 2. Solve automata problems using push down automata and Turing machines. 3. Construct context free grammar for Chomsky and Griebach normal forms.
	D S E C	**MCAC04A4 1**	**Advanced Parallel Processing**	1. Discuss distributed memory programming with message passing interface. 2. Describe shared memory programming with a multiprocessing interface. 3. Explain the performance of distributed systems. 4. Develop software to solve pipelined computations and message passing computing and programming environments and the principles of virtualization.
	D S E C	**MCAD04A4 1**	**Cloud Computing**	1. Discuss distributed memory programming with message passing interface. 2. Describe shared memory programming with a multiprocessing interface. 3. Explain the performance of distributed systems. 4. Develop software to solve pipelined computations and message passing computing and programming environments and the principles of virtualization.
	D S E C	**MCAS04A41**	**E-Commerce and M-Commerce**	1. Explain EDI, its applications in business, legal, security and privacy issues and its relation to electronic commerce. 2. Analyze the difference between mobile and electronic commerce, types of mobile commerce services, technologies and its framework. 3. Identify the importance of cybersecurity and cyber laws for e-commerce applications. 4. Use electronic payment systems like e-cheque, e-cash, credit and debit cards and smart cards.
	D S E C	**MCAT04A4 1**	**Software Testing and Quality Management**	1. Apply software testing process, criteria, strategies, and methods for testing applications. 2. Use control flow, data flow and program mutations for determining test design, test automation and test coverage criteria. 3. Apply static and dynamic testing techniques and methods to achieve verified and validated software. 4. Infer the concepts related to Software Quality Attributes, Quality Planning, Software Quality Control and Software Quality Assurance. 5. Illustrate Testing & Quality Assurance activities on software products

				using automated and semi-automated software tools.
	D S E C	MCAU04A41	**Multimedia Communications**	1. Interpret the networks, operating system, and database management system, architecture, developing tools and authoring tools needed for multimedia applications. 2. Explain the Virtual Reality concepts and processes of hand gloves, head mounted tracking system and displays, and VR chair. 3. Apply lossy and lossless compression algorithms for text and image. 4. Describe technical characteristics and performance of multimedia devices.
	D S E C	MCAV04A41	**Agile Methodologies**	1. Infer the software development principles and practices associated with agile methodologies. 2. Describe Lean/Agile development frameworks and Extreme Programming practice. 3. Develop techniques and tools for improving team collaboration and software quality. 4. Analyze agile software development and plan driven process model. 5. Apply test-driven development, stand-up meetings, and pair programming for software engineering practice.
SEC		MSE4L2A41	**J2EE Practical**	1. design web-based information systems using HTML5, CSS, JavaScript 2. develop interactive, client-side, server-side executable web applications using Integrated Development Environment Tools 3. integrate the features of platforms and frameworks using hibernate, spring, struts in web applications development
[Any ONE to be opted]	N C C C	MRP5R1A01	**Research Paper Presentation/ Publication**	1. prepare reports and interpret the outputs of regression, classification and dimension reduction analysis
	N C C C	MOL501A01	**Online Course**	1. Build new skills which leads to career advancement. 2. Develop a deeper understanding of the concepts in the curriculum.

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V Semester			
DSCC	MCA204A51	Internet of Things	1. Explain the fundamentals, challenges, and performance techniques of wireless networks. 2. Analyse the physical layer, network layer and application layer protocols for developing IoT application. 3. Design an IoT system using Arduino and Raspberry Pi. 4. Demonstrate the smart lighting, smart parking and smart traffic system. 5. Choose Analytics platforms for processing IoT data.
DSCC	MCA204A52	Mobile Application Development	1. Demonstrate the working principles of Android Operating System. 2. Explain techniques of using android software development tools. 3. Develop programs to deploy, debug and run on mobile devices.
DSCC	MCA204A53	Software Project Management	1. Explain the project planning, analysis, identification, and resource estimation activities covered by the software project management. 2. Analyze the project strategic and technical assessment and risk evaluation. 3. Use Hackman Job Characteristics Model for people management and organizing teams. 4. Apply concept of project scheduling, monitoring and controlling using MS Project.
DSCP	MCA2P2A51	SPM Project	1. Develop practical solutions to identify problems based on web based applications, and business applications. 2. Use the MS Project Management tool required for project planning, monitoring and control.
Elective Courses [Any ONE to be opted]	DSEC MCAA04A51	Open source Technologies	1. Identify the importance of Free Open Source Software platform for SDLC. 2. Analyze the Linux installation and Hardware Configuration related process. 3. Apply programming constructs and functionalities using python or Ruby programming language. 4. Construct UML diagrams using ARGO UML and version control using Git open source software.

		D S E C	MCAB04A 51	Software Testing Tools	1. Apply Automation Testing Approach for software test suites. 2. Demonstrate Selenium server installation using script in Java/PHP. 3. Evaluate a specific web page, update of records into tables and Excel files using the Selenium tool.
		D S E C	MCAC04A 51	Cloud Application Development	1. Categorize compute service, storage service, communication service and cost model of Google cloud, Amazon AWS, Microsoft Azure platforms and cloud application life cycle for application development. Interpret HTTP request handling using AJAX techniques formatting with JSON and REST API. 2. Design user interface for cloud application using AngularJS. 3. Create database-oriented web applications and web services using Ruby and Rail framework. 4. Analyze cloud based software engineering, analytic service, database, and authentication service using AWS.
Elective Courses Group2 [Any ONE D	Domain 1	D S E C	MCAS04A 51	NoSQL Databases	1. Distinguish graph, key-value pairs, document-oriented and column-oriented NoSQL databases. 2. Explain the architecture, define objects, load data, query data and performance of MongoDB. 3. Create web applications using PHP and Python with NoSQL as the backend database.
		D S E P	MCASP2A 51	Project on NoSQL Databases	1. Develop a user interface using Python and PHP. 2. Demonstrate front-end connectivity with NoSQL database.
	Domain 2	D S E C	MCAT04A 51	Machine Learning and Deep Learning Techniques	1. Distinguish between, supervised, unsupervised and semi-supervised learning. 2. Summarize neural networks and genetic algorithms. 3. Apply different Dimensionality reduction techniques.
		D S E P	MCATP2A 51	Project on Machine Learning and Deep Learning Techniques	1. Develop an application using machine learning concepts. 2. Formulate a deep learning architecture for specified requirements.
	Domain 3	D S E C	MCAU04 A51	Digital Image Processing	1. Discover image fundamentals, visual perception, RGB Models, HSI Model, Image sampling, Quantization, and DFT, DCT, KLT and SVD using 2D Transforms Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contra harmonic mean, Homomorphic filtering techniques.

Course Type			Course Code	Course Title	Course Outcome
omain to be opted]					2. Categorize degradation model, unconstrained restoration - Lagrange multiplier and constrained restoration, inverse filtering, removal of blur, Wiener filtering, and Geometric transformations in spatial domain for Image Restoration. 3. Distinguish Edge detection, Edge linking via Hough transform, Thresholding, Region based segmentation, Region growing, splitting and Merging, Morphological watersheds, Dam construction and Watershed algorithm for Segmentation. 4. Implement Huffman, Run Length Encoding, shift codes, Arithmetic coding, JPEG and MPEG standard compression techniques. 5. Analyze Histogram equalization and specification.
	DSEP		MCAUP2A51	Project on Digital Image Processing	1. Create enhanced images using OPENCV. 2. Apply image filtering and restoration techniques to restore the image.
SEC			MSE4L2A51	Python Programming Practical	1. Create a software application using the python programming language 2. Formulate database application using python 3. Create user defined functions in python 4. Debug a software application written in the python programming language 5. Test a software application written in the python programming language
[Any ONE to be opted]	NCCC		MAE501A01	Aptitude Enhancement Sessions	1. To hone the core competencies of the students and build confidence and professional attitude
	NCCC		MEX5A1A01	Extension Activity	1. To access the hardships in rural areas with respect to infra-structure and other facilities analyses the life of rural India by being a part of the rural exposure camp

VI Semester

Course Type	Course Code	Course Title	Course Outcome
DSCP	MCA2P0A61	Major Project	1. Develop solutions for framed problem statements recommended by the organization. 2. Implement hardware or software techniques for framed problems and test the modules of the developed project. 3. Write technical reports and deliver project presentations.

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