Shivaji University, Kolhapur

Department of Computer Science

Name of Programme: Master of Computer Application (MCA)

Vision		
To impart training to analyze problems and develop human resources in order to produce computer Professionals, academics and researchers.		
Mission		
To train students for fundamental and advanced programming techniques right from essential mathematics and managerial science to high performance computing and soft computing.		
Program Outcomes		
1. Nurture knowledgeable and skilled human resources, employable in Information and Communication Technology (ICT) and Information Technology Enable Services (ITES). 2. Ability to apply knowledge of Mathematical Foundations in computing problems. 3. Impart knowledge required for planning, designing and building complex Application. 4. Software Systems as well as provide support to automated systems or application. 5. Produce entrepreneurs who can develop customized software solutions for small to large Enterprises. 6. Ability to apply modern IT tools and computational knowledge for developing solutions In context to societal, environmental and sustainable development with ethical and Professional responsibility. 7. Ability to function as an effective communicator and team member through essential Skills in multidisciplinary projects.		
Program Specific Outcomes		
1. Understand the concepts and applications in the field of Computing Sciences like Web designing and development, Mobile application development, and Network and communication technologies. 2. Apply the learning from the courses and develop applications for real world problems. 3. Understand the technological developments in the usage of modern design and development tools to analyze and design for a variety of applications. 4. Communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.		
Course Outcomes		
Part-I Semester-I		
MCA 11	Fundamentals of Computer	1. Understand basic components and capabilities of a typical computing system 2. To impart the knowledge in the field of digital electronics 3. To understand the importance of the hardware interface

		4. To understand the working of Multiprocessor systems
MCA 12	Python Programming	1. Understand principles of Python 2. Understand object oriented programming 3. Demonstrate file handling techniques 4. Understand how Python can be used for application development 5. Design Real life problems and think creatively about solution of them 6. Apply a solution clearly and accurately in a program using python
MCA 13	Discrete Mathematics	1. To develop logical thinking and its application to computer science 2. To emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument). 3. Ability to reason and ability to present a coherent and mathematically accurate argument. 4. Better understanding of logic, proofs, functions, relations, etc.
MCA 14	Database Management System	1. Learn and practice data modelling using the entity-relationship and developing database designs. 2. Understand the use of Structured Query Language (SQL) and learn SQL syntax. 3. Apply normalization techniques to normalize the database 4. Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.
MCA 15	Principles of Management and Accounting	1. Students will get foundation of the process of management's four functions: planning, organizing, leading, and controlling. 2. Students will have effective decision making and controlling skills for working as a team leader. 3. Students can understand the nature and role of the principal financial statements. 4. Students can understand the basic concepts of costs in financial statements.
Part-I Semester-II		
MCA 21	Linux Foundation	1. Learn the Linux Command Line interface and become a skilled user of this powerful operating system. 2. In this course, students will learn the principles of shell programming . 3. Learn how to write and build C programs within the Linux operating system. 4. Students will learn basics of Linux administration and socket programming with Linux.
MCA 22	Data Structures	1. Select appropriate data structures as applied to specified problem definition

	using Python	2. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures. 3. Students will be able to implement linear and Non-Linear data structures. 4. Implement appropriate sorting/searching technique for given problem. 5. Design advance data structure using Non-Linear data structure. 6. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues, Red-Black trees, Btrees. 7. Be familiar with some graph algorithms such as shortest path and minimum spanning tree 8. Determine and analyze the complexity of given Algorithms.
MCA 23	Statistics Computing	1. Acquaint students with basic concepts in statistics. 2. To learn and interpret elementary statistical methods of analysis of data 3. Will be able to compute various measures of central tendencies, dispersion, Correlation and Regression analysis. 4. Analyse data using standard statistical technique
MCA 24	Web Designing Technology	1. Understand the basic structure of web designing technology. 2. Apply the concepts of web technology in designing static and dynamic web pages. 3. Select and apply markup languages for processing, identifying, and presenting of information in web pages. 4. Design interactive web pages using scripting technology like JavaScript, AJAX and XML.
MCA 25	Software Engineering	1. Students will get foundation of software engineering, various process models and can apply the new models in development process. 2. Students will have effective communication and interaction skills for requirement engineering tasks. 3. Students can apply design principles for various types of software and designing object oriented software using UML tools. 4. Students can implement testing strategies thoroughly using testing tools. 5. Students will understand the need of lifelong learning and adapt to new software engineering concepts.
MCA Part-II Semester-III		
IT31	Software Engineering	1. To understand the nature of the discipline of Software engineering. 2. Student will be able to understand the Selection of software development process with justification, which is most appropriate for the development and maintenance of a diverse range of software products.

		3. To know the basic software engineering approaches for requirements, design, coding, testing, maintenance, and quality assurance 4. To interpret and apply software design principles and modelling 5. Student will be able to understand the formal methods in software development. 6. Student will be able to understand and apply software testing techniques 7. To be apprised of how to elicit requirements from a client and specify them. 8. To apply different software design principles and coding standards
IT32	Java Programming	1. They will understand the benefits of Open source languages. 2. Students will able to use various object-oriented technology concepts using java programs 3. Students will design implement, test, debug and document programs in java 4. Student will able to develop software independently.
IT33	Computer Networks	1. Analyze the basics of data communications and network architecture. 2. Analyze functions of each layer of a computer network. 3. Evaluate essential features of specific protocols in the common protocol suite. 4. Analyze the methodology and the rationale behind addressing, routing, and congestion control. 5. Understand various multiplexing and switching methods used in networks. 6. Evaluate wireless LANs, high-speed digital access, such DSL and cable modem, cellular phone, and satellite networks
BM31	Management Support System	1. Develop ability to understand different types of Information systems that exist in an organization 2. Describe the phases of the decision-making process in a typical organization and the types of decisions that are made 3. Describe a decision support system 4. Explain an executive information system's importance in decision making 5. Further the student would be aware of various business Intelligence tools like Data warehouses, AI & Expert system, Intelligent support system MSS in E-business.
MT31	Probability and Combinatorics	1. Use basic counting principles to answer combinatorial counting problems. 2. Will be able to apply define permutations and use them in combinatorial problems. 3. Will understand binomial coefficients and use them in combinatorial

		problems. 4. Will be able to define multinomial coefficients and use them to answer Combinatorial problems. 5. In-depth knowledge of Probability: different definitions, properties, Multiplication laws, State and apply Bayes' formula to calculate conditional probabilities. 6. Understand mass function and cumulative distribution function. 7. Will be able to define properties of Bernoulli, Binomial and Poisson distribution. 8. Understand concept of Hypothesis with Chi-square test, t-test, and paired t-test.
CS31	Communication Skill –II	1. Capable of effectively monitoring, analysing, and adjusting their own communication behaviour. 2. Demonstrate appropriate and effective conflict management strategies. 3. Capable of addressing perceptual differences in relational communication for effective outcomes. 4. Demonstrate the ability to effectively deliver formal presentations before a variety of live audiences. 5. Demonstrate proficiency in the use of written English, including proper spelling, grammar, and punctuation. 6. Demonstrate proficiency in formal writing, including correct use of a designated style of source citation, such as APA. 7. Construct appropriate messages for a variety of contexts/situations.
IT32 L	LAB V (Java Programming	1. Students will read and understand Java-based software code of medium-to-high complexity. 2. Students will use standard and third party Java's API's when writing applications. 3. Students will understand the basic principles of creating Java applications with graphical user interface (GUI). 4. Students will create rich user-interface applications using modern API's s 5. Students will understand the fundamental concepts of computer science: structure of the computational process and algorithms 6. Students will understand the basic approaches to the design of software applications. 7. Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes.
IT33 L	Lab VI Open Source Languages (PHP)	1. This design course will equip students with principles, knowledge and skills for the design and construction of Website and Web Application Development using Open Source Language PHP. 2. On completion of this course, a student will able to develop a web application using PHP technologies. Students will gain the skills and project-based experience needed for entry into web application and

		development careers. 3. Students will combine multiple web technologies to create advanced, dynamic & effective website by the using of HTML, Java script, MySQL, CSS and PHP. 4. Students will acquire knowledge and Skills for creation of Web Site using PHP and MySQL. PHP as a web development option which is secure, fast and reliable and offers numerous advantages. Syntactically, it is one of the easiest languages to learn. Design websites using appropriate security principles, focusing specifically on the vulnerabilities inherent in common web implementations. 5. Conceptualize and plan an internet-based business that applies appropriate business models and web technologies. 6. Incorporate best practices in navigation, usability and written content to design websites that give users easy access to the information they seek.
MCA-II Semester-IV		
IT41	Advance Java	1. This course covers topics JavaBeans, RMI, Hibernate, JDBC, Servlet & CORBA. After completing this course, the student will be able to develop distributed business applications, develop web pages using advanced server-side programming through servlets and Java server page. 2. In addition, the student will be able to demonstrate approaches for performance and effective coding and Develop Java client/server applications. 3. It develops advanced Java programming skills that are required to fully utilize the capabilities of this object-oriented, general-purpose programming language. 4. This course is to provide the ability to design console based, GUI based and web-based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications
IT42	Data Mining	1. To introduce the concept of data mining as an important tool for enterprise data management and as a cutting-edge technology for building competitive advantage. 2. To enable students to effectively identify sources of data and process it for data mining 3. To make students well versed in all data mining algorithms, methods of evaluation. 4. To impart knowledge of tools used for data mining 5. To provide knowledge on how to gather and analyze large sets of data to

		gain useful business understanding. 6. To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business
Elective I IT4E.1	Computer Graphics	1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and 2. To learn the basic principles of 2 and 3- dimensional computer graphics. 3. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition. 4. Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections. 5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications. 6. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.
Elective I IT4E.2	Cloud Computing	1. Explain the core issues of cloud computing such as security, privacy, and interoperability. 2. To build a private cloud. 3. Identify the architecture and infrastructure of cloud computing, including SAAS, PAAS, IAAS, public cloud, private cloud, hybrid cloud, etc. 4. Attempt to generate new ideas and innovations in cloud computing 5. Develop and deploy cloud application using popular cloud platforms 6. Analyze the Cloud Computing setup with its vulnerabilities and applications using different architectures 7. Make recommendations on cloud computing solutions for an enterprise. 8. Discuss, with confidence, what is cloud computing and what are key security and control considerations within cloud computing environments 9. Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building a private cloud 10. Summarize specific environments that would benefit from implementing cloud computing, contrasted against those environments that might not benefit .
		1. To understand why Python is a useful scripting language for developers. 2. To learn how to design and program Python applications.

Elective I IT4E.3	Python Programming	3. To learn how to use lists, tuples, and dictionaries in Python programs. 4. To learn how to identify Python object types. 5. To learn how to use indexing and slicing to access data in Python programs. 6. To define the structure and components of a Python program. 7. To learn how to write loops and decision statements in Python. 8. To learn how to write functions and pass arguments in Python. 9. To learn how to build and package Python modules for reusability. 10. To learn how to read and write files in Python. 11. To learn how to design object-oriented programs with Python classes. 12. Expertise in creating, populating, retrieving, deleting, updating databases. .
Elective I IT4E.4	Theory of Computation	1. Define languages by abstract, recursive definitions and by regular expressions. 2. Design a finite automaton to recognize a given regular language. 3. Transform a language into regular expression or finite automaton or transition graph. 4. Define deterministic and nondeterministic finite automata. 5. Prove properties of regular languages and classify them. 6. Determine decidability, finiteness and equivalence properties. 7. Define relationship between regular languages and context-free grammars. 8. Building a context-free grammar for pushdown automata. 9. Determine whether a given language is context-free language or not. 10. Prove properties of context-free languages. 11. Design Turing machine for a given language. 12. Discuss the concept of computability.
BM41	Organizational Behavior	1. Differentiate between dependent and independent variables in OB and have a basic 2. knowledge of key relationships between them 3. Appreciate the role that individual characteristics, personality and values have on behavior 4. in organizations 5. Discuss attitude measurement and job satisfaction characteristics 6. Summarize and discuss perceptions, learning, individual decision and motivation theories 7. Discuss foundations of group behavior. 8. Communicating in teams and organizations 9. Appreciate the role of communication 10. Define leadership and analyze key related theories 11. Appreciate the role of power and politics in organizations 12. Explain the dynamics of conflict and negotiation 13. Identify major issues in Human Resource Policies and Practices

Elective I BM4 E.1	Entrepreneurship Development	1. Encouraged to initiate their own star ups in field of Computer Science 2. Students will gain confidence to be job creator rather than job seeker 3. Gain knowledge about company structure, working, raising funds, and other essential requirements for Entrepreneurship Development 4. Will carry out a field work to understand practical Entrepreneurship development
Elective I BM4 E.2	Human Resource Management	1. Students will gain knowledge about managing the human resources to best of their ability for maximum productivity in organization development. 2. To understand emotional quotient, Social quotient and intelligent quotient of an employee working in organization 3. Grasp different psychology of an individual which will help them to assign work in organization 4. Application of leadership qualities.
Elective I BM4 E.3	Supply Chain Management	1. Students will analyse the manufacturing operation of the firm 2. Students will apply sales operation planning, MRP and lean manufacturing concepts 3. Students will apply quality management tools for process improvement. 4. Will carry out field visits to understand practical implementation.
Elective I BM4 E.4	Performance Evaluation & Computer Centre Management	1. 1. To understand measures of performance evaluation 2. To familiar with nature of computer systems, Basic parameters and measures of effectiveness. 3. To analyze systems with service discriminations 4. To know workload modelling and characterization, 5. To learn performance tuning and improvement
MP41	Mini Project	1. Gain skills as they apply knowledge effectively in diverse contexts. 2. Analyse and model requirements and constraints for the purpose of designing and implementing software artefacts and IT systems 3. Design and implement software solutions that accommodate specified requirements and constraints, based on analysis or modelling or requirements specification 4. Present a clear, coherent and independent exposition of software applications, alternative IT solutions, and decision recommendations to both IT and non-IT personnel via technical reports of professional standard and technical presentations.

		5. Team work: Work effectively in different roles, to form, manage, and successfully produce outcomes from teams, whose members may have diverse cultural backgrounds and life circumstances, and differing levels of technical expertise.
IT41 L	LABVII (Advance Java)	1. Define & explain applet Life cycle 2. Differentiate local and remote applet 3. Explain applet tag and its parameter 4. Use the methods of the Applet and Component classes required for a basic applet 5. Describe the classes in the AWT package that relate to the Applet class 6. Describe the AWT graphics explain controls and how to apply them in the container 7. Develop simple programs using Event class and Event Listener Interface 8. Explain the different Types of JDBC drivers & their advantages and Disadvantages 9. Develop program to use JDBC to query a database and modify 10. Describe life cycle of servlet 11. Explain JSP Architecture and its Life cycle
IT42 L	LAB VIII (Data Mining)	1. Synthesize the data mining fundamental concepts and techniques from multiple perspectives. 2. Develop skills and apply data mining tools for solving practical problems 3. Advance relevant programming skills using data mining tools. 4. Gain experience and develop research skills by reading the data mining literature.
MCA-III Semester-V		
IT51	Artificial Intelligence and Applications	1. Apply problem solving by intelligent search approach. 2. Represent knowledge using AI knowledge representation techniques. 3. Design Machine Learning solution to real life problems. 4. Derive solutions for problems with uncertainty using Fuzzy theory. 5. Investigate Neural network models 6. Describe the flow of a genetic algorithm and identify its elements. 7. Select and apply suitable operators and parameters for a genetic algorithm 8. Apply genetic algorithms for optimum solution for problems. 9. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
IT52	Advance	1. Debug and deploy ASP.NET web applications

	Web Technology	2. Discuss the insights of internet programming and implement complete application over the web 3. Use the features of Dot Net Framework along with the features of C# 4. Build and host web applications using ASP.NET 5. Develop and deploy Windows applications 6. Handle data by using ADO.NET architecture 7. Create database-driven ASP.NET web applications and web services 8. Handle various toolkit like AJAX 9. Utilize the concepts of JavaScript 10. Develop and deploy a website using HTML
Elective–I IT5E.1	Cryptography & Network	1. Understand the fundamental principles of access control models and techniques, authentication and secure system design. 2. Understand the basics of cryptography and encryption systems. 3. Understand principles and practice of different encryption techniques. 4. Identify and mitigate different network security systems.
Elective–I IT5E.2	Distribute Computing	1. Demonstrate knowledge of the basic elements and concepts related to distributed system technologies; 2. Demonstrate knowledge of the core architectural aspects of distributed systems; 3. Design and implement distributed applications; 4. Demonstrate knowledge of details the main underlying components of distributed systems (such as Synchronization, file systems) 5. Use and apply important methods in distributed systems to support scalability and fault tolerance; 6. Understand distributed Operating systems (Amoeba, Mach) and designing distributed systems.
Elective–I IT5E.3-	Mobile Computing	1. Student will able to develop a mobile application using Android technologies. 2. This course will prepare students enriched with knowledge of Android platform, Architecture and features. 3. This course will prepare students with knowledge of design User Interface and develop activity for Android App. 4. Student feels confident enough after this course to take on development of many innovative applications. There is rapidly growing career in android application development.
Electi	Big Data	1. Understanding of Big Data for Business Intelligence

ve–I IT5E.4	Management	2. Understanding different tools for Big Data Analytics. 3. To study issues relating Big Data Security. 4. Learn end to end skills of Big data Analytics
Elective II BM5E.1	Management Information System	1. To learn computer based IS for capturing, storing, analysing, processing and supporting for decision making at various level in organization. 2. To study various information system security issues and policies. 3. To learn various applications of information system in organization 4. Able to apply managerial skills to manage data.
Elective–II BM5E.2-	Knowledge Management	1.To compare data and knowledge, knowledge acquisition tools, types of knowledge management drivers 2. To define and identify 5C Process, 3. To describe Knowledge Management System life cycle with its applications 4. To find out need and benefits of organization knowledge management. 5. Understand knowledge mapping techniques, knowledge creation, and architecture. 6. To identify knowledge centres. 7. To understand knowledge management system testing and deployment.
Elective–II BM5E.3	Software Project Management and Quality Assurance	1. This design course will equip students for making successful careers in software 2. Quality assurance and software project management with a thorough understanding of software project management concepts which can be applied to solve real-world problems. 3. The program will prepare students to be successful professionals in the field with solid fundamental knowledge of software project management like, Project management, Risk Management, Software Project Estimation, Configuration Management, Software Quality Management and Testing. 4. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes. 5. It will help to demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle and project management. 6. It will help to demonstrate an ability to use the techniques and tools necessary for engineering practice. 7. Understand quality management processes. 8. Distinguish between the various activities of quality assurance, quality planning and quality control. 9. Understand the importance of standards in the quality management process and their impact on the final product.

Elective–II BM5 E.4	Enterprise Resource Planning	1. To know e concepts of BPR and its need for industry. 2. To understand concept of ERP, evolution, need and significance. 3. To study the ERP implementation life cycle and ERP market 4. To apply ERP system using a case study.
MT51	Optimization Techniques	1. To formulate a real-world problem as a mathematical programming model. 2. To solve specialized linear programming problems like the transportation, assignment, game problems 3. To study applications of Optimization Techniques. 4. Apply optimization techniques to given problem.
	Industrial seminar	1. To Generate a report based on the experiences and projects carried out with the ability to apply knowledge of recent trends 2. To present their research work in suitable format 3. To learn general problem-solving techniques available 4. To use standard paper format required during publication.
IT51L	LAB IX (Artificial Intelligence and Applications)	1. Understand the differences between networks for supervised and unsupervised learning 2. Design single and multi-layer feed-forward neural networks 3. Develop and train radial-basis function networks 4. Program linear and nonlinear models for data mining 5. Analyze the performance of neural networks 6. Describe the flow of a genetic algorithm and identify its elements 7. Select and apply suitable operators and parameters for a genetic algorithm 8. Design genetic algorithms for single and multiple objective optimization problems 9. Apply the concepts of fuzzy sets, knowledge representation using fuzzy r fuzzy inference systems.
IT52L	LAB X (Advance Web Technology)	1. To develop a dynamic webpage by the use of ASP.NET 2. To write a well formed / valid XML document. 3. To connect web form to a MS SQL Server and perform insert, update and delete operations on DBMS table. 4. To user state management techniques available in asp.net 5. To use all the validation controls 6. To apply CSS to the webpages 7. Use scripting languages and web services to transfer data and add interactive components to web pages

		8. Use fundamental skills to maintain web server services required to host a website
MCA-III Semester-VI		
IT61	Project Work	1. Apply the knowledge gained in to develop software suit for digitization of society. 2. Demonstrated their ability to work independently and collaboratively 3. Developed their abilities in problem solving and critical judgement 4. Demonstrated their ability to effectively collect, analyse and organise digital information 5. Acquired written and verbal communication skills that allow them to communicate a convincing and reasoned technical argument at a level and style appropriate to the audience. 6. Contributed to group discussions on career preparedness and ethical and professional practice