MCA
Scheme 2021

Program Outcomes

1. **Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
2. **Problem Analysis:** Identify, formulate, research literature, and solve complex computing problem searching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
3. **Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. **Conduct investigations of complex Computing problems:** User search-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
6. **Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.
7. **Life-long Learning:** Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
8. **Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team to manage projects and in multidisciplinary environments.
9. **Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
10. **Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
11. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
12. **Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment ofthe individual and society at large

Course Outcomes

First Semester:

Course Code: PGCA-B1

Course Name:Computer Programming using C

Course Outcomes: **After the course completion, students will be able to :**	
PGCA B1.1	Express the logical flow used in Programming

PGCA B1.2	Design algorithms for solving various real life problems
PGCA B1.3	Implement programs using C
PGCA B1.4	Choose the right data type and statements for programs
PGCA B1.5	Explain various concepts of C programming language.

Course Code: PGCA-B2
Course Name: Computer Science Essentials

Course Outcomes: **After the course completion, students will be able to :**	
PGCA B2.1	Identify various components of computer system including input and output devices.
PGCA B2.2	Prepare documents using word processing, Spreadsheet and Presentation tools.
PGCA B2.3	Outline the key components of Database Management system
PGCA B2.4	Explain the role of operating system.
PGCA B2.5	Define various components, modes and topologies of computer networks.

Course Code: PGCA 1917
Course Name: Discrete Structures and Optimization

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1917.1	Explain the use of Venn diagrams to solve applied problems
PGCA 1917.2	Apply rules of inference.
PGCA 1917.3	Write proofs using symbolic logic and Boolean Algebra
PGCA 1917.4	Applying elementary counting techniques using the product and sum rules, permutations, combinations, the pigeon-hole principle
PGCA 1917.5	Identify the type of graphs.

Course Code: PGCA 1951
Course Name: Programming in Python

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1951.1	Explain environment, data types, operators used in Python.
PGCA 1951.2	Compare Python with other programming languages.
PGCA 1951.3	Outline the use of control structures and numerous native data types with their methods.
PGCA 1951.4	Design user defined functions, modules, files, and packages and exception handling methods.
PGCA 1951.5	Write solutions for Object Oriented Programming Concepts.

Course Code:PGCA 1952
Course Name: Advanced Data Structures

Course Outcomes: **After the course completion, students will be able to :**

PGCA 1925.1	Choose appropriate data structures and algorithms and use it to design solution for a specific problem.
PGCA 1925.2	Execute the operations of hashing to retrieve data from data structure.
PGCA 1925.3	Design and analyze programming problem statements
PGCA 1925.4	Define proofs of correctness
PGCA 1925.5	Select algorithm design approaches in a problem specific manner.

Course Code:PGCA 1953
Course Name: Advanced Database Management System

Course Outcomes: **After the course completion, students will be able to:**	
PGCA 1953.1	Express the basic concepts of DBMS and RDBMS.
PGCA 1953.2	Apply normalization theory to the normalization of a database
PGCA 1953.3	Explain Transaction Management & Recovery techniques in RDBMS.
PGCA 1953.4	Outline characteristics of advanced databases prevailing in market
PGCA 1953.5	Demonstrate No SQL databases (Open Source)

Course Code: PGCA 1905
Course Name: Technical Communication

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1905.1	Outline the benefits of effective communication
PGCA 1905.2	Execute proficiency in reading & listening, comprehension, writing and speaking skills.
PGCA 1905.3	Apply spoken and written English language in their chosen technical field.
PGCA 1905.4	Illustrate flueny in coversation.
PGCA 1905.5	Write their own clear and coherent texts.

Course Code: PGCA 1954
Course Name: Data Structures using Python Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1954.1	Analyze various algorithms based on their time and space complexity.
PGCA 1954.2	Create different data structures in C/ C++
PGCA 1954.3	Implement various operations of all data structures
PGCA 1954.4	Illustrate the outcome of various operations with the help of examples.
PGCA 1954.5	Write programs to implement various types of searching and sorting algorithms

Course Code: PGCA 1955
Course Name: Advanced Database Management System Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1955.1	Implement query a database using SQL DML/DDL commands.
PGCA 1955.2	Analyze integrity constraints on a database.
PGCA 1955.3	Develop PL/SQL programs including stored procedures, stored functions, cursors.
PGCA 1955.4	Design new database and modify existing ones for new applications and reason

	about the efficiency of the result.
PGCA 1955.5	Execute the role of DBA.

Course Code: PGCA 1908
Course Name: Technical Communication Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1908.1	Demonstrate the benefits of effective communication.
PGCA 1908.2	Execute proficiency in reading & listening, comprehension, writing and speaking skills.
PGCA 1908.3	Apply spoken and written English language in their chosen technical field.
PGCA 1908.4	Illustrate fluently in conversation.
PGCA 1908.5	Write their own clear and coherent texts

Second Semester:

Course Code: PGCA1909
Course Name: Web Technologies

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1909.1	Create pages with simple tags in HTML.
PGCA 1909.2	Design webpages with multiple sections or frames.
PGCA 1909.3	Explain how to link webpages through hypertext or images a links.
PGCA 1909.4	Outline the key web designing concepts using java script.
PGCA 1909.5	Design forms with special controls using HTML.

Course Code: PGCA1920
Course Name: Design & Analysis of Algorithms

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1920.1	Define algorithm and its complexity.
PGCA 1920.2	Categorize problems based on their characteristics and practical importance.
PGCA 1920.3	Develop Algorithms using iterative/recursive approach
PGCA 1920.4	Design algorithm using an appropriate design paradigm for solving a given problem
PGCA 1920.5	Categorize problems as P, NP or NP Complete

Course Code: PGCA1918
Course Name: Advanced Java

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1918.1	Explain the role of servlets
PGCA 1918.2	Select the right technology/ tool for problem based solutions
PGCA 1918.3	Implement web concepts using java server pages
PGCA 1918.4	Implement database connectivity
PGCA 1918.5	Illustrate invocation of remote methods

Course Code: PGCA 1956
Course Name: Linux Administration

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1956.1	Discuss the evolution of Open Source operating systems.
PGCA 1956.2	Prepare environment for working on open source operating system like Linux.
PGCA 1956.3	Perform resource management in Linux.
PGCA 1956.4	Write scripts in Linux.
PGCA 1956.5	Execute user level priviledges.

Course Code: PGCA 1932
Course Name: Information Security and Cyber Law

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1932.1	Identify issues involved in the field of information security.
PGCA 1932.2	Explain the key security requirements of Confidentiality, Integrity &Availability.
PGCA 1932.3	Demonstrate the concept of Intrusion Detection & Intrusion Prevention
PGCA 1932.4	Apply Symmetric Encryption techniques.
PGCA 1932.5	Describe the concept of Security policies and Cyber Laws.

Course Code:PGCA 1914
Course Name: Web Technologies Laboratory

Course Outcomes:Course Code: **After the course completion, students will be able to :**	
PGCA 1914.1	Design pages with simple tags in HTML
PGCA 1914.2	Create web pages with Audio and Video content in it.
PGCA 1914.3	Illustrate the movement from one web page to another
PGCA 1914.4	Implement advanced web designing concepts using java script
PGCA 1914.5	Execute a small web passed project for the benefit of society

Course Code: PGCA 1922
Course Name: Advanced Java Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1922.1	Implement servlets to handle HTTP requests
PGCA 1922.2	Demonstrate session and cookies management
PGCA 1922.3	Implement the concept of database management.
PGCA 1922.4	Outline the concept of SEO.
PGCA 1922.5	Create applications using advanced concepts like JavaBean, Struts, Hibernate, etc.

Course Code: PGCS 1957
Course Name: Linux Administration Laboratory

Course Outcomes:

After the course completion, students will be able to :	
PGCA 1957.1	Prepare the environment for installation and use of Linux operating system.
PGCA 1957.2	Write Shell Scripts.
PGCA 1957.3	Implement C programs using gcc compiler.
PGCA 1957.4	Implement virtualization.
PGCA 1957.5	Execute commands related to grantinf and revoking user priviledges.

Course Code: PGCA 1925
Course Name: Advanced Computer Networking

Course Outcomes: After the course completion, students will be able to :	
PGCA 1925.1	Define computer networks.
PGCA 1925.2	Identify the role played by different layers of network model
PGCA 1925.3	Outline the concept of Internet protocols and network security.
PGCA 1925.4	Highlight the benefits of Adhoc networks
PGCA 1925.5	Explain the protocols used in wireless communication systems.

Course Code: PGCA 1926
Course Name: Artificial Intelligence & Soft Computing

Course Outcomes: After the course completion, students will be able to :	
PGCA1926.1	Highlight the significance of Artificial Intelligence in knowledge representation.
PGCA1926.2	Examine the useful search techniques; learn their advantages, disadvantages and comparison.
PGCA1926.3	Explain neural network theory and fuzzy logic theory.
PGCA1926.4	Apply artificial neural networks and fuzzy logic theory for various problems.
PGCA1926.5	Determine the use of Genetic algorithm to obtain optimized solutions to problems.

Course Code: PGCA 1927
Course Name: Theory of Computation

Course Outcomes: After the course completion, students will be able to :	
PGCA1927.1	Define formal languages and automata.
PGCA1927.2	Design Finite Automata's for different Regular Expressions and Languages
PGCA1927.3	Prepare context free grammar for various languages.
PGCA1927.4	Illustrate how push down automata and Turing Machine can be used to solve computational problems.
PGCA1927.5	Define complexity and computability concept

Course Code: PGCA 1928
Course Name: Advanced Computer Networking Laboratory

Course Outcomes: After the course completion, students will be able to :

PGCA1928.1	Demonstrate sharing of resources of network.
PGCA1928.2	Prepare different types of network cables
PGCA1928.3	Write programs for simulating routing algorithms
PGCA1928.4	Implement the configuration of Adhoc networks
PGCA1928.5	Execute configuration of wireless access points

Course Code: PGCA 1929
Course Name: Artificial Intelligence & Soft Computing Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1929.1	Write programs for basic AI problems.
PGCA1929.2	Apply artificial neural networks and fuzzy logic theory for various problems.
PGCA1929.3	Prepare training data.
PGCA1929.4	Design back propagation network.
PGCA1929.5	Implement different operations on fuzzy sets

Course Code: PGCA 1930
Course Name: Software Project Management

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1930.1	Define the principal tasks of software project management.
PGCA1930.2	Outline the basic concepts of Software projects
PGCA1930.3	Explain the fundamentals of Process Planning, effort estimation and quality planning
PGCA1930.4	Comment upon risk and quality management
PGCA1930.5	Apply management and development practices to develop software.

Course Code: PGCA 1971
Course Name: Optimization Techniques

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1971.1	Define the scope of operation research
PGCA1971.2	Solve linear programming problems
PGCA1971.3	Prepare feasible solutions for transportation and assignment problems
PGCA1971.4	Outline the Project Management problems using CPM
PGCA1971.5	Find solution to various optimization problems

Course Code: PGCA 1972
Course Name: Data Mining and Business Intelligence

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1972.1	Highlight the need of Data Warehousing & Mining
PGCA1972.2	Differentiate between the Transactional and Analytical data models.
PGCA1972.3	Identify the real life applications where data mining can be applied.
PGCA1972.4	Apply different data mining algorithms on wide range of data sets.

PGCA1972.5	Comment on latest tools for data mining and big data analysis

Course Code: PGCA 1973
Course Name: Enterprise Resource Planning PGCA1973

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1973.1	Define ERP & Related Technologies
PGCA1973.2	Compare different types of ERP functional modules.
PGCA1973.3	Explain Implementation Strategies of ERP.
PGCA1973.4	Discuss the latest trends and domains of ERP.
PGCA1973.5	Analyze various case studies related to ERP implementation.

Course Code: PGCA 1933
Course Name: Mobile Application Development

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1933.1	Define framework of mobile application development
PGCA1933.2	Comment upon the building blocks of mobile computing
PGCA1933.3	Test the mobile applications
PGCA1933.4	Compare development environment of different operating systems for mobile application development.
PGCA1933.5	Write programs for basic mobile applications

Course Code: PGCA 1934
Course Name: Mobile Application Development Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1934.1	Prepare environment for coding and running mobile applications
PGCA1934.2	Develop mobile applications using GUI and Layouts.
PGCA1934.3	Develop mobile applications for different mobile operating systems.
PGCA1934.4	Test Mobile Applications.
PGCA1934.5	Implement database connectivity with mobile applications.

Course Code: PGCA 1935
Course Name: Simulation & Modelling

Course Outcomes : **After the course completion, students will be able to :**	
PGCA1935.1	Identify the paradigms and approaches used to design the simulation.
PGCA1935.2	Compare different types of simulation, techniques and methods
PGCA1935.3	Apply concepts of computer simulation for types of inputs, system models, outputbehavior and performance estimation
PGCA1935.4	Test the goodness of a simulation by analyzing the simulated data.
PGCA1935.5	Highlight features of different simulation modeling software's

Course Code: PGCA 1936
Course Name: Simulation & Modelling Laboratory

Course Outcomes: After the course completion, students will be able to :	
PGCA1936.1	Use software tools for modelling and analysis of mathematical concepts for engineering application.
PGCA1936.2	Simulate discrete problems using queuing systems
PGCA1936.3	Model and analyze simple engineering concepts and its importance in engineering applications.
PGCA1936.4	Apply simulation software to construct and execute goal-driven system models.
PGCA1936.5	Create Simulation Projects

Course Code: PGCA 1921
Course Name: E-Commerce & Digital Marketing

Course Outcomes: After the course completion, students will be able to :	
PGCA1921.1	Discuss the scope of ecommerce.
PGCA1921.2	Explain payment modes used in ecommerce today.
PGCA1921.3	Execute a comprehensive digital marketing strategy and plan
PGCA1921.4	Describe the use digital marketing for multiple goals within a larger marketing and/or media strategy.
PGCA1921.5	List the major digital marketing channels.

Course Code: **PGCA 1974 (in Scheme) / PGCA1955 (in syllabus)**
Course Name: e-Commerce and Digital Marketing Laboratory

Course Outcomes: After the course completion, students will be able to :	
PGCA 1955.1	Implement E-Commerce applications.
PGCA 1955.2	Develop digital marketing strategy and plan
PGCA 1955.3	Design effective digital and social media strategies
PGCA 1955.4	Discuss social, and security issues concerning the digital marketing and e-commerce.
PGCA 1955.5	Implement a project for E-Commerce and Digital Marketing

Course Code: PGCA 1931
Course Name: Software Testing & Quality Assurance

Course Outcomes: After the course completion, students will be able to :	
PGCA1931.1	Explain various approaches of software testing and quality assurance for software development.
PGCA1931.2	Create test strategies, design test cases, prioritize and execute them.
PGCA1931.3	Identify various risks involved with software projects and build risk management
PGCA1931.4	Plan software management and configuration activities.
PGCA1931.5	Discuss the risk management involved in software development.

Course Code: **PGCA 1975 (in Scheme) / PGCA1956 (in syllabus)**
Course Name: Software Testing & Quality Assurance Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1956.1	Explain various approaches of software testing and quality assurance for software development.
PGCA 1956.2	Create test strategies, design test cases, prioritize and execute them.
PGCA 1956.3	Identify various risks involved with software projects and build risk management.
PGCA 1956.4	Plan software management and configuration activities.
PGCA 1956.5	Discuss the risk management involved in software development

Course Code: PGCA 1976
Course Name: Machine Learning and Data Analytics using Python

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1976.1	Explain Machine Learning concepts.
PGCA1976.2	Differentiate between supervised and unsupervised learning
PGCA1976.3	Discuss clustering and classification algorithms
PGCA1976.4	Analyze data using Python Numpy, Panda Libraries
PGCA1976.5	Implement data visualization using matplotlib library of Python

Course Code: PGCA 1958
Course Name: Advanced Web Technologies

Course Outcome: **After the course completion, students will be able to :**	
PGCA 1958.1	Explain client-side and server-side programming.
PGCA 1958.2	Discuss web data and XML document handling.
PGCA 1958.3	Describe the role of AJAX.
PGCA 1958.4	Develop a dynamic webpage by the use of java PHP and MySQL.
PGCA 1958.5	Apply basic CRUD database operations in a Dynamic Website.
PGCA 1958.6	Discuss basic web services and their development.

Course Code: PGCA 1977
Course Name: Machine Learning and Data Analytics using Python Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1977.1	Develop knowledge of various learning models of data.
PGCA1977.2	Implement a wide variety of learning algorithms.
PGCA1977.3	Evaluate models generated from data.
PGCA1977.4	Apply the algorithms to a real-world problems.
PGCA1977.5	Optimize the models learned and report on the expected accuracy that can be achieved byapplying the models.

Course Code: PGCA 1960
Course Name: Advanced Web Technologies Laboratory PGCA 1960

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1960.1	Understand the advance concepts of website development.
PGCA 1960.2	Design dynamic web sites.
PGCA 1960.3	Implement database programming for web applications
PGCA 1960.4	Implement jQuery methods, AJAX, Bootstrap and REACT
PGCA 1960.5	Perform basic CRUD operations.
PGCA 1960.6	Develop market ready website, to be used by clients.

Course Code: PGCA 1937
Course Name: Cloud Computing

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1937.1	Discuss the basic concept and importance of cloud computing.
PGCA1937.2	Explain the process of migrating to a cloud solution for different applications
PGCA1937.3	Compare and evaluate the virtualization technologies.
PGCA1937.4	Monitor and manage the cloud resources, applications and data while addressing the security concerns.
PGCA1937.5	Use cloud solutions offered by industry leaders for various applications.

Course Code: PGCA 1938
Course Name: Cloud Computing Laboratory

Course Outcomes: **After the course completion, students will be able to :**	
PGCA 1938.1	Create applications for SaaS.
PGCA 1938.2	Develop cloud applications using popular cloud platforms.
PGCA 1938.3	Create virtual machines on the cloud.
PGCA 1938.4	Implement cloud storage management tasks.
PGCA 1938.5	Develop private cloud.

Course Code: PGCA 1963
Course Name: Digital Image Processing

Course Outcomes: **After the course completion, students will be able to :**	
PGCA1963.1	Discuss the need of various image transforms along with properties
PGCA1963.2	Learn different techniques employed for the enhancement of images
PGCA1963.3	Describe the rapid advances in Machine vision
PGCA1963.4	Analyze images in multi resolution environment
PGCA1963.5	Evaluate image compression techniques

Course Code: PGCA 1964
Course Name: Digital Image Processing Laboratory

Course Outcomes:

After the course completion, students will be able to :	
PGCA1964.1	Implement the various operations which can be performed on images.
PGCA1964.2	Apply filters on images as per the requirement
PGCA1964.3	Implement different techniques employed for the enhancement of images
PGCA1964.4	Implement image compression
PGCA1964.5	Develop an Image Processing Application

Course Code: PGCA 1965
Course Name: NLP and Speech Recognition

Course Outcomes: After the course completion, students will be able to :	
PGCA1965.1	Discuss the fundamental concepts of natural language processing
PGCA1965.2	Explain text normalization, use of edit distance, and regular expressions
PGCA1965.3	Implement Naive bayes and sentiment classification algorithms
PGCA1965.4	Familiarize with chatbots and phonetics
PGCA1965.5	Describe the concept of speech recognition and text to speech conversion.

Course Code: PGCA 1966
Course Name:NLP and Speech Recognition Laboratory

Course Outcomes: After the course completion, students will be able to :	
PGCA1966.1	Develop knowledge of various learning models of data**.**
PGCA1966.2	Analyze performance of various learning algorithms.
PGCA1966.3	Evaluate models generated from data.
PGCA1966.4	Apply the algorithms to a real-world problems.
PGCA1966.5	Optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Code: PGCA 1967
Course Name:IOT &Blockchain Technology PGCA1967

Course Outcomes: After the course completion, students will be able to :	
PGCA1967.1	Discuss the terminology and enabling technologies of IoT and Blockchain
PGCA1967.2	Identify various element of IoT.
PGCA1967.3	Enumerate the steps involved in IoT system design methodology
PGCA1967.4	Describe the working of bit coin crypto currency
PGCA1967.5	List domain specific applications of IoT and Blockchain

Course Code: PGCA 1968
Course Name:IOT &Blockchain Technology Laboratory

Course Outcomes: After the course completion, students will be able to :	
PGCA1968.1	Use IoT sensors and remotely monitor data and control devices.
PGCA1968.2	Develop real life IoT based projects.
PGCA1968.3	Discussblockchain technology and develop blockchain based solutions.

PGCA1968.4	Deploy IoT based blockchain applications for on-premise and cloud based architecture.
PGCA1968.5	Create docker based application.