

**GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE,
RAJNANDGAON (C.G.)**



DEPARTMENT OF COMPUTER SCIENCE

**PROGRAMME OUTCOMES AND COURSE OUTCOMES
2023-24**

**SYLLABUS OF 4 YEARS UG PROGRAM (FYUGP) IN COMPUTER
SCIENCE,
GOVT. DIGVIJAY AUTONOMOUS P G COLLEGE, RAJNANDGAON,
AS PER NEP 2020 (SEMESTER-I AND II)**

Program Objective (PO)

- PO1- It is to give foundation knowledge for the students to understand advance Computer Science including applied aspect for the same.
- PO2- It is to develop enhanced quantative skills and pursueing higher Computer Science andresearch as well as.
- PO3- Students will be able to develop software as well as operating knowledge computer application.
- PO4- Students will become employable in various governments, public and private sectors.
- PO5- Scientific tempers in general and computer temper in particular will the developed in students.
- PO6- Sufficient subject matter competence and enable students to prepare for various competitive examinations such as GATE, UGC-CSIR, NET/JRF and Civil Services Examinations.

Program Specific Outcome (PSO)

- PSO 1 - Ability to learn basics fundamental of computer. Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
- PSO 2 - Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation.
- PSO 3 - Ability to learn and acquire knowledge through online courses available at different MOOC Providers.
- PSO 4 - Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.
- PSO 5 - Display ethical code of conduct in usage of Internet and Cyber systems.
- PSO 6 - Ability to pursue higher studies of specialization and to take up technical employment.
- PSO 7 - Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate .
- PSO 8 - Ability to operate, manage, deploy, configure computer network, hardware,software operation of an organization.
- PSO 9 - Ability to present result using different presentation tools.
- PSO 10 - Ability to appreciate emerging technologies and tools.

Session: **2023-24**

Program: **B.Sc. (Maths)**

Semester: I	Subject: Computer Science
Course Type: Core Course (CC 1A)	Course Code:
Course Title:	Computer Fundamentals & Programming Methodologies
Credit: 4(3Theory + 1Practical)	Lecture: 45(T)+ 15(P)
M.M. 100 = Theory(ESE 80+ IA 20) (Theory)	Minimum Passing Marks: 40%
M.M. 50= 50 (Internal 10 + Practical Practical) Record – 20 + Practical 10 + Viva 10)	Minimum Passing Marks: 40%

Title	Computer Fundamentals & Programming Methodologies
Course Learning Outcome:	<ul style="list-style-type: none"> •Learn Basics of Computer Fundamentals. •Learn computer related number system and codes. •Learn to develop simple algorithms and flow charts to solve a problem. •Develop problem solving skills coupled with top down design principles. •Learn about the strategies of writing efficient and well-structured computer algorithms / programs. •Learn the about the ‘C’ programming language. •Develop the skills for formulating iterative solutions to a problem. •Understand recursive techniques in programming. •Learn array processing algorithms coupled with iterative methods. •Learn text and string processing efficient algorithms. •Learn structure , union and use of pointers.

Session: 2023-24	Program: B.Sc.
Semester: II	Subject: Computer Science
Course Type: Core Course (CC 2A)	Course Code:
Course Title:	Data Structure using ‘C’
Credit: 4(3Theory + 1Practical)	Lecture: 45(T)+ 15(P)
M.M. 100 = Theory(ESE 80+ IA 20) (Theory)	Minimum Passing Marks: 40%

M.M. 50= 50 (Internal 10 + Practical Practical) Record – 20 + Practical 10 + Viva 10)	(Minimum Passing Marks: 40%
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Title	Data Structure using ‘C’
Course Learning Outcome:	<ul style="list-style-type: none"> •To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles. •To have a knowledge of complexity of basic operations like insert, delete, search on these data structures. •Ability to choose a data structure to suitably model any data used in computer applications. •Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc. •Ability to assess efficiency tradeoffs among different data structure implementations. •Implement and know the applications of algorithms for sorting, pattern matching etc.

AS PER NEP 2020 (SEMESTER-III AND IV)

Program Objective (PO)

- PO1- It is to give foundation knowledge for the students to understand advance Computer Science including applied aspect for the same.
- PO2- It is to develop enhanced quantative skills and pursuing higher Computer Science and research as well as.
- PO3- Students will be able to develop software as well as operating knowledge computer application.
- PO4- Students will become employable in various governments, public and private sectors.
- PO5- Scientific tempers in general and computer temper in particular will the developed in students.
- PO6- Sufficient subject matter competence and enable students to prepare for various competitive examinations such as GATE, UGC-CSIR, NET/JRF and Civil Services Examinations.

Program Specific Outcome (PSO)

- PSO1- Student should be able to understand the inside of operating system machenism as well as FOSS with Linux.
- PSO2- Student should be able to know the hardware working parts and its architecture which help to working in hardware field.

PSO3- Student understand and programming knowledge of python programming.

PSO4- Student should be able to working in Database management system.

PSO5- Student should be able to know the inside of computer networks working as well as functions of using networking hardware devices.

PSO6- Student should be able to know functions and development website.

Session: 2023-24	Program: B.Sc. (Maths)
Semester: III	Subject: Computer Science
Course Type: DSC	Course Code:
Course Title:	Operating System with Linux
Credit: 4 (3 Theory + 1 Practical)	Lecture: 60
M.M. 100 = Theory(ESE 80+ IA 20) (Theory)	Minimum Passing Marks: 40%
M.M. 50= 50 (Internal 10 + Practical (Practical) Record – 20 + Practical 10 + Viva 10)	Minimum Passing Marks: 40%

Title	Operating System with Linux
Course Learning Outcome:	<ul style="list-style-type: none"> •Describe the important computer system resources and the role of operating system in their management policies and algorithms. •To understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time. •Understanding of design issues associated with operating systems. •Understand various process management concepts including scheduling, synchronization, and deadlocks. •To understand concepts of memory management including virtual memory. •To have sound knowledge of various types of operating systems including Unix and Android. •Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve. •Students will be able to understand key features of the various Linux Operating Systems. •Implement various commands of Linux Operating System. •Students will be able to understand the directory structure, shell commands and shell scripting of Operating System.

Session: 2023-24	Program: B.Sc.
Semester: III	Subject: Computer Science
Course Type: DSE	Course Code:
Course Title:	Computer Organization & Architecture
Credit: 4	Lecture: 60
M.M. 100 = (ESE 80+IA 20)	Minimum Passing Marks: 40%

Title	Computer Organization & Architecture
Course Learning Outcome:	<ul style="list-style-type: none"> •To make students understand the basic structure, operation and characteristics of digital computer. •To familiarize the students with arithmetic and logic unit as well as the concept of the concept of pipelining. •To familiarize the students with hierarchical memory system including cache memories and virtual memory. •To make students know the different ways of communicating with I/O devices and standard I/O interfaces.

Session: 2023-24	Program: B.Sc.
Semester: III	Subject: Computer Science
Course Type: SEC	Course Code:
Course Title:	Python Programming
Credit: 2	Lecture: 30
M.M. 50= (Internal 10 + Practical Record – 20 + Practical 10 + Viva 10)	Minimum Passing Marks: 40%

Title	Python Programming
Course Learning Outcome:	<ul style="list-style-type: none"> •Develop and Execute simple Python programs. Structure a Python program into functions. •Using Python lists, tuples to represent compound data Develop Python Programs for file processing
Title	DATABASE MANAGEMENT SYSTEMS

Course Learning Outcome:	<ul style="list-style-type: none"> •Gain knowledge of database systems and database management systems software. •Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design data base schemas based on the model. •Formulate, using SQL, solutions to a broad range of query and data update problems. •Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. •Be acquainted with the basics of transaction processing and concurrency control. •Familiarity with database storage structures and access techniques. Compare, contrast and analyse the various emerging technologies for database systems such as NoSQL. •Analyse strengths and weaknesses of the applications of database technologies to various subject areas. •Demonstrate an understanding of the relational data model. •Transform an information model into a relational database schema and to use a DDL,DCL and DML, and/or utilities to implement the schema using a DBMS. •Formulate, using relational algebra, solutions to a broad range of query problems. •Formulate, using SQL, solutions to a broad range of query and data update problems.
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Session: 2023-24	Program: B.Sc.
Semester: III	Subject: .Computer Science
Course Type: DSE	Course Code:
Course Title:	Computer Networks
Credit: 4	Lecture: 60
M.M. 100= (ESE 80 + IA 20)	Minimum Passing Marks: 40%

Title	Computer Networks
Course Learning Outcome:	<ul style="list-style-type: none"> •Understand the structure of Data Communications System and its components. Be familiarize with different network terminologies. •Familiarize with contemporary issues in network technologies. •Know the layered model approach explained in OSI and TCP/IP network models Identify different types of network devices and their functions within a network. Learn basic routing mechanisms, IP addressing scheme and internetworking concepts. •Familiarize with IP and TCP Internet protocols. •To understand major concepts involved in design of WAN, LAN and

	wireless networks. •Learn basics of network configuration and maintenance. •Know the fundamentals of network security issues.
Session: 2023-24	Program: B.Sc.
Semester: III	Subject: Computer Science
Course Type: SEC	Course Code:
Course Title:	Web Programming
Credit: 2	Lecture: 30
M.M. 50 = (Internal 10 + Practical Record – 20 + Practical 10 + Viva 10)	Minimum Passing Marks: 40%

Title	Web Programming
Course Learning Outcome:	<ul style="list-style-type: none"> •To understand basics of the Internet and World Wide Web •To acquire knowledge and skills for creation of web site considering both client and server-side programming •To learn basic skill to develop responsive web applications •To understand different web extensions and web services standards •To understand basic concepts of Search Engine Basics. •To learn Web Service Essentials. •To learn Rich Internet Application Technologies. •Writeprogramand Design web pages using HTML •Discussmodularapproachbyworkingwithfunctions andderive datatypes. <ul style="list-style-type: none"> •Format and validate web pages using CSS and Java Script.

B. SC. PART – III
COMPUTER SCIENCE
PAPER – I
COMPUTER HARDWARE

AIM : The emphasis is on the design concepts & organisational details of the common PC, leaving the complicated Electronics of the system to the computer engineers.

Objective of the Course :

1. To introduce the overall organisation of the microcomputers and operating systems.
2. To introduce the interaction of common devices used with computers with operating softwares, excluding the Assembly languages, with special reference to DOS/WINDOWS.
3. To introduce the working of hardware components, Micro-Processor and various chips used in micro-computers by operating system, without the use of electronic circuitry.
4. To introduce the use of operating systems architecture with IBM-PC & clones, excluding Assembly language, with forms an important part of hardwares.

B. SC. PART – III
COMPUTER SCIENCE
PAPER – II
COMPUTER SOFTWARE

Aim : To introduce DBMS and RDBMS using Back-end tool and Front-end tool.

Object of the Course :

1. To introduce Data Base Management System concepts.
2. To introduce the Relational Database Management System and Relational Database Design.
3. To introduce the RDBMS software and utility of query language.
4. To introduce basic concept of GUI Programming and database connectivity using Visual Basic.

MASTER OF SCIENCE IN COMPUTER SCIENCE

•Program Outcome

•After the completion of the course students will be able to:

•The Masters programme aims to impart a sound understanding of the advanced principles of Computer Science.

•It provides sufficient depth and breadth of experience in up-to-date methodologies.

•An exhaustive treatment of selected research-based topics, to significantly advance a student's career prospects within the IT industry, and/or equip the student to undertake research in Computer Science.

•The programme provides theory, elective, practical, research paper, Industrial Plant Training and software project courses as a core courses.

FIRST SEMESTER

Paper I : Mathematical Foundation of Computer Science

Course Outcome:

- Understand the concepts of Digital Electronics.
- Apply the concept of Automata Theory
- Solve the problems with Optimization Methods
- Use the hypothetical testing
- Familiar with the graph theory and its applications

Paper II: Advance Operating Systems

Course Outcome:

- Design and understand the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.
- Evaluate, and compare OS components through instrumentation for performance analysis.
- Analyze the various device and resource management techniques for timesharing and distributed systems.
- Develop and analyze simple concurrent programs using transactional memory and message passing, and to understand the trade-offs and implementation decision.

Paper III: Data Structure through algorithms using 'C'

Course Outcome:

- Develop efficient algorithms for solving a problem.
- Use the various construct of programming language viz., conditional, iteration and recursion.
- Implement the algorithm in programming language.
- Use simple data structure like array, stacks and linked list in solving problems.

Paper IV : Object Oriented Programming using 'C++'

Course Outcome:

- Understand object oriented programming, difference between object oriented programming and procedural programming.
- Able to build program using C++ features such as Class, objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
- Able to build C++classes using appropriate encapsulation and design principles.
- Improve problem solving skills by applying object oriented or non-object oriented techniques

Paper V: Computer System Architecture

Course Outcome:

- Get concepts of the basics organizational and architectural issues of a digital computer.
- Analyze performance issues in processor and memory design of a digital computer.
- Understand various data transfer techniques in digital computer.
- Explain block diagram of CPU, Memory and types of I/O transfers

Practical

M.Sc. (CS) - I: Practical Based on Paper III (Data Structure through Algorithms using ‘C’)

Course Outcome:

- Implement efficient algorithms and identify the appropriate data structure for solving a problem using C.
- Implement simple data structure like array and stacks using C.
- Be able to design and analyze the time and space efficiency of the data structure .
- Have practical knowledge on the applications of data structures.
- Implement abstract data types using arrays and linked list.
- Implement different types of trees and apply them to problem solutions.
- Discuss graph structure and understand various operations on graphs and their applicability. Analyze the various sorting and searching algorithms.

M.Sc.(CS) - I : Practical Based on Paper IV(Object Oriented Programming Using ‘C++ ’)

Course Outcome:

- Able to build program using C++ features such as Class, objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
- Able to build C++classes using appropriate encapsulation and design principles.

SECOND SEMESTER

Paper I: RDBMS (SQL Programming *with* Oracle)

Course Outcome

Students will be able to:

- Establish a basic understanding of the process of Database Development and Administration using MySQL.
- Student will implement the concepts of both Operating Systems & Database Administration skills.
- Understand fundamental concepts of RDBMS (SQL/PLSQL)
- Understand functioning of database management systems as well as associated tools and techniques
- Develop a good database design and normalization techniques to normalize a database.
- Able to write Procedure, Function, Cursor and Trigger using SQL/PLSQL.

Paper II: Advanced Computer Networks

Course Outcome

- Understand basic computer network technology.
- Understand Data Communications System and its components.

- Enumerate the layers of the OSI model and TCP/IP reference model.
- Able to identify the different types of network devices, their functions within a network and their applications.

Paper III: Python Programming

Course Outcome

- Knowledge about the Python programming.
- Define the Structure and Components of a Python Program.
- Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries.
- Discover the commonly used operations involving regular expressions and file systems.
- Determine the need of scrapping website and working with CSV, JSON and other file formats.
- Discover the commonly used of data science in Python.
- Demonstrate proficiency in handling of NumPY & Pandas Library.
- Demonstrate proficiency in handling of GUI programming using Tkinter.

Paper IV: Principles of Compiler Design

Course Outcome

- Specify and analyze the lexical, syntactic and semantic structures of advanced language features
- Separate the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation
- Write a scanner, parser, and semantic analyzer without the aid of automatic generators
- Turn fully processed source code for a novel language into machine code for a novel computer
- Describe techniques for intermediate code and machine code optimization
- Design the structures and support required for compiling advanced language features.

Paper V: Numerical Analysis

Course Outcome

- Root finding for nonlinear equations,
- Interpolation and approximation of functions by simpler computational building blocks (for example - polynomials and splines).
- Numerical differentiation and divided differences.
- Numerical quadrature and integration,
- numerical solutions of ordinary differential equations and boundary value problems;

M.Sc. (CS) - II: Practical Based on Paper I (SQL Programming with Oracle)

Course Outcome

- Establish a basic understanding of the process of Database Development and Administration using MySQL.
- Master the basic concepts and appreciate the applications of database systems.
- Master the basics of SQL and construct queries using SQL.
- Student will implement the concepts of both Operating Systems & Database Administration skills.
- Understand functioning of database management systems as well as associated tools and techniques
- Develop a good database design and normalization techniques to normalize a database.
- Able to write Procedure, Function, Cursor and Trigger using SQL/PLSQL.

M.Sc.(CS)-II : Practical Based on Paper III (Python Programming)

Course Outcome

- Learn the Numbers, Math functions, Strings, List in Python.
- Learn the tuples and dictionaries in Python.
- Demonstrate proficiency in handling of loops and creation of functions.
- Identify the methods to create and manipulate lists, tuples and dictionaries.
- Express different decision making statements and functions.

- Demonstrate proficiency in handling of NumPY & Pandas Library.
- Demonstrate proficiency in handling of GUI programming using tkinter.

THIRD SEMESTER

Paper I: Programming in Java

Course Outcome:

- Develop Applet Programming with various techniques.
- Develop applications using AWT.
- Working with Graphics ,Color and Font
- Working with JDBC Classes(Database Operations- Create, Insert, Delete, Update, Select)
- Handling Result Set and Statements.
- Working with Servlet and JDBC
- Handling Client/Server Networking
- Working with Java Collections.

Paper II: Computer Graphics

Course Outcome:

- Students will have an appreciation of the history and evolution of computer graphics, both hardware and software. Assessed by written homework assignment.
- Students will have an understanding of 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations. They will be able to implement these. Assessed by tests and programming assignments.
- Students will understand the concepts of and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping. Students will be exposed to current computer graphics research areas. Assessed by tests, homework and programming assignments.
- Students will be able to use a current graphics API (OpenGL). Assessed by programming assignments.
- Students will be introduced to algorithms and techniques fundamental to 3D computer graphics and will understand the relationship between the 2D and 3D versions of such algorithms. Students will be able to reason about and apply these algorithms and techniques in new situations. Assessed by tests and programming assignments.

Paper III: LINUX

Course Outcome:

- Find the latest version of a distribution of Linux
- Install, configure and use Linux to run as a server or a desktop
- Use CLI to perform many administrative functions on Linux either server or desktop
- Find, install, configure and update software on a Linux server or desktop
- Manage users' accounts, permissions and authorization on a Linux server or a desktop
- Manage file systems on a Linux server or desktop
- Run desktop virtualization on a wide variety of operating systems including Windows and Linux Setup Linux to provide a service depending on what the needs are ie., DNS, DHCP, WWW, email, file and print
- Able to knowledge and working with Indian Linux BOSS, Libre office.

Paper IV: Image Processing

Course Outcome:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- Review the fundamental concepts of a digital image processing system.
- Analyze images in the frequency domain using various transforms.
- Evaluate the techniques for image enhancement and image restoration.
- Categorize various compression techniques.
- Interpret Image compression standards.
- Interpret image segmentation and representation techniques.

Paper V: Object Oriented Analysis And Design**Course Outcome:**

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- be able to use an object-oriented method for analysis and design
- be able to analyze information systems in real-world settings and to conduct methods such as interviews and observations
- have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other IS development methods and techniques
- know techniques aimed to achieve the objective and expected results of a systems development process
- know different types of prototyping.

know how to use UML for notation

FORTH SEMESTER**Paper I: Software Engineering****Course Outcome:**

- Research the state-of-the-art, and apply their findings to software testing and quality assurance;
- Analyze different approaches to software testing and quality assurance, and select optimal solutions for different situations and projects;
- Conduct independent research in software testing and quality assurance and apply that knowledge in their future research and practice;
- Evaluate the work of peers constructively by following proven methods of peer-review, and by using the principles of research ethics.

Paper II: Research Methodology**Course Outcome:**

- Identify and discuss the role and importance of research in the field of sciences.
- Identify and discuss the issues and concepts salient to the research process.
- Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
- Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.
- Use of software tools based on research.

Paper III: Elective 1. Data Mining & Data Warehouse

Course Outcome:

- Shift through all the chaotic and repetitive noise in your data.
- Understand what is relevant and then make good use of that information to assess likely outcomes.
- Accelerate the pace of making informed decisions.
- Design the data analytics life cycle for selected problem statement.

Paper III: Elective 2. Artificial Intelligence and Expert System**Course Outcome:**

- To analyze and formalize the problem as a state space, graph, design heuristics.
- Ability to represent solutions for various real-life problem domains using logic based techniques.
- Understand the numerous applications and huge possibilities in the field of AI.
- Ability to express the ideas in AI research and programming language related to emerging technology.

Paper III: Elective 3. Advanced Computer Architecture**Course Outcome:**

- To make students know about the Parallelism concepts in Programming.
- To make the students know about the importance of multiprocessor and multicomputer.
- To introduce the Interconnection network to the students.
- To study about data flow computer architectures.
- To study Linear and non-Linear pipelining.
- To understand the Advance processor Technology.

To know about the Parallel Algorithm

Major Project**Course Outcome:**

- Demonstrate a sound technical knowledge of their selected project/Dissertation topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilizing a systems approach.
- Conduct an engineering project/Dissertation.
- Communicate with engineers and the community at large in written or oral forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.
- Project-based learning connects students to the real world.
- Understand the concept of research, writing and publish the research paper.
- Prepares students to accept and meet challenges in the real world, mirroring what professionals do every day.