



# School of Computer Science & IT Devi Ahilya Vishwavidyalaya

## SYLLABUS

### BCA 3 years/ BCA (Hons./ Research) 4 years

#### Program Educational Objectives (PEOs)

- PEO 1:** Exhibit a strong inclination towards higher education and actively pursue in continuous development of their professional skills.
- PEO 2:** Develop communication and soft skills to inculcate professionalism for working in cross-cultural and global environment.
- PEO 3:** Build expertise on latest technological trends to bridge gap between industry and academia for better employability.
- PEO 4:** Evolve competency to design and develop computing applications that address the societal needs.

#### Program Specific Outcomes (PSOs)

- PSO 1:** Apply knowledge of computing and inter-disciplinary techniques to design and develop quality software applications.
- PSO 2:** Ability to use modern tools and frameworks to create innovative solutions in emerging areas.

## II - SEMESTER

## CS-1102: MATHEMATICS- II

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### Course Outcomes (COs):

- CO1:** Understand and apply Fourier series and Laplace transforms to solve ordinary differential equations and analyze periodic functions.
- CO2:** Solve second-order differential equations with variable coefficients using advanced analytical methods.
- CO3:** Use the series method to solve differential equations and understand the significance of Legendre's and Bessel's functions.
- CO4:** Develop the ability to solve partial differential equations of first and second order using separation of variables.
- CO5:** Apply vector calculus concepts and integral theorems in evaluating line, surface, and volume integrals.
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### Course Contents

#### UNIT-I

**No. of Hours: 8**

Fourier Series. Half Range Fourier Series, Laplace transforms & Inverse Laplace transforms of simple functions, their elementary properties, applications of Laplace in solution of ordinary differential Equations.

#### UNIT-II

**No. of Hours: 8**

Second Order Differential Equation with Variables Coefficients (Only by method: One solution is known and Variation of Parameters).

#### UNIT-III

**No. of Hours: 8**

Solution of Differential Equation by Series method, Legendre's and Bessel's equation and their elementary properties.

#### UNIT-IV

**No. of Hours: 8**

Linear and Non-Linear Partial differential equation of first and second order with constant coefficients, Separation of variable method.

#### UNIT-V

**No. of Hours: 8**

Vector calculus, Vector Differentiation, Velocity and acceleration, Gradient, Divergence and Curl. Line and Surface integral, Stoke's and Gauss divergence theorem.

#### Text Books:

1. Dr. D.C. Agarwal, "Engineering Mathematics I", Shree Sai Prakashan; 2022nd edition
2. H. K. Dass, "Higher Engineering Mathematics", S. Chand & Company; 3rd Edition 2014

**Reference Books:**

1. Dr. B. S Grewal, "Higher Engineering Mathematics", 36th Edition, Khanna Publishers, 2001.
2. B V Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill Education, 2006.

**Online Resources:**

## CS-1501: OPERATING SYSTEM BASICS & PC PACKAGES

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### Course Outcomes (COs):

**CO1:** Understand the role and functions of operating systems in resource management.

**CO2:** Create and format documents using MS Office tools.

**CO3:** Explain process management concepts like states and context switching.

**CO4:** Analyze and apply CPU scheduling algorithms.

**CO5:** Understand memory management and disk scheduling techniques.

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### Course Contents

#### UNIT-I

**No. of Hours: 6**

Introduction to MS Office Tools: Overview of MS Word, MS Excel, and MS PowerPoint. Introduction to Operating System: Definition, evolution, functions, and services of operating systems; the role of the operating system in resource management.

#### UNIT-II

**No. of Hours: 6**

Types of Operating Systems: Multiprogramming, time-sharing, and multitasking. Process Management: Process concept, process states, process state diagrams, and Process Control Block (PCB).

#### UNIT-III

**No. of Hours: 6**

CPU Scheduling: Basic concepts, scheduling criteria, short-term, long-term, and medium-term schedulers, context switching, and the role of the dispatcher.

#### UNIT-IV

**No. of Hours: 6**

Scheduling Algorithms: Non-Preemptive: First Come First Serve (FCFS), Shortest Job First (SJF), etc. Preemptive: Shortest Remaining Time First (SRTF), Round Robin, Priority scheduling, etc. Advantages and disadvantages of various scheduling algorithms.

#### UNIT-V

**No. of Hours: 6**

Basics of Memory Management: Importance of memory management, fixed and variable partitions, internal and external fragmentation. Disk Management: Disk structure and disk arm scheduling algorithms.

#### Text Books:

1. Operating System Concepts - Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Wiley, 10th Edition.
2. Working in Microsoft Office- Ron Mansfield, McGraw-Hill Osborne Media, 1st Edition.

#### Reference Books:

1. Modern Operating Systems: Andrew S. Tanenbaum, Prentice Hall, 3rd Edition.

**Online Resources:**

1. [https://onlinecourses.swayam2.ac.in/ntr25\\_ed41/preview](https://onlinecourses.swayam2.ac.in/ntr25_ed41/preview)
2. <https://www.cse.iitb.ac.in/~mythili/os/>
3. <https://cse.iitkgp.ac.in/~ksrao/caos2018files/OS-introduction.pdf>

# CS-1501: OPERATING SYSTEM BASICS & PC PACKAGES - PRACTICAL

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## Course Outcomes (COs):

**CO1:** Utilize MS Office tools and understand the basics, functions, and services of operating systems.

**CO2:** Differentiate types of operating systems and analyze process management concepts.

**CO3:** Explain CPU scheduling techniques and simulate the role of schedulers and dispatchers.

**CO4:** Implement and evaluate various CPU scheduling algorithms for performance optimization.

**CO5:** Apply memory and disk management techniques, including fragmentation and disk scheduling algorithms.

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## Course Contents

### UNIT-I

**No. of Hours: 4**

Introduction to MS Office Tools and Operating System Basics:

1. MS Word Practical:
  - Create a formatted document with a table of contents, headers, footers, and page numbers.
  - Design a resume using templates and advanced formatting tools.
2. MS Excel Practical:
  - Create a spreadsheet to calculate student grades using formulas and functions (e.g., SUM, AVERAGE, IF).
  - Design a sales report using charts and conditional formatting.
3. MS PowerPoint Practical:
  - Develop a presentation on a topic with animations, transitions, and embedded media.
4. Operating System Basics:
  - Demonstrate operating system installation and configuration.
  - Explore OS services using basic commands.

### UNIT-II

**No. of Hours: 4**

Process Management and Operating Systems:

1. Exploring Operating System Types:
  - Compare the working of a time-sharing OS vs. a multitasking OS using simulation tools.
2. Process Management:
  - Simulate process states (new, ready, running, waiting, terminated) using process state diagrams.
  - Demonstrate the creation and termination of processes using shell scripting.
3. Process Control Block (PCB):
  - Design a simple PCB representation using a spreadsheet or a C/JAVA/Python program.

### UNIT-III

**No. of Hours: 6**

CPU Scheduling:

1. CPU Scheduling Concepts:

- Create a program to simulate context switching among processes.
  - Write a program to identify the role of a dispatcher in process scheduling.
2. Scheduling Criteria:
- Calculate scheduling criteria such as waiting time and turnaround time using a C/JAVA/Python program.

#### **UNIT-IV**

**No. of Hours: 6**

Scheduling Algorithms:

1. Non-Preemptive Scheduling:
  - Implement the First Come First Serve (FCFS) and Shortest Job First (SJF) scheduling algorithms.
2. Preemptive Scheduling:
  - Simulate Shortest Remaining Time First (SRTF) and Round Robin scheduling algorithms.
3. Comparison of Algorithms:
  - Write a program to compare and analyze the performance of different scheduling algorithms (e.g., average waiting time).

#### **UNIT-V**

**No. of Hours: 4**

Memory and Disk Management:

1. Memory Management:
  - Simulate fixed and variable memory partitioning.
  - Demonstrate internal and external fragmentation through visual tools or simulations.
2. Disk Management:
  - Write a program to simulate disk arm scheduling algorithms (e.g., FCFS, SSTF).
  - Analyze the performance of different disk scheduling algorithms in terms of seek time.
3. Practical Assignment:
  - Demonstrate a case study on memory and disk management in a real-world OS.

#### **Text Books:**

1. Operating Systems Concepts with Java - Abraham Silberschatz, Greg Gagne, Peter B. Galvin, Wiley, 6th Edition.
2. Working in Microsoft Office- Ron Mansfield, McGraw-Hill Osborne Media, 1st Edition.

#### **Reference Books:**

1. Modern Operating Systems: Andrew S. Tanenbaum, Prentice Hall, 3rd Edition.

#### **Online Resources:**

1. [https://onlinecourses.swayam2.ac.in/ntr25\\_ed41/preview](https://onlinecourses.swayam2.ac.in/ntr25_ed41/preview)
2. <https://www.cse.iitb.ac.in/~mythili/os/>
3. <https://cse.iitkgp.ac.in/~ksrao/caos2018files/OS-introduction.pdf>

## CS-2020: ELECTRONIC CIRCUITS

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### Course Outcomes (COs):

- CO1:** Apply and analyse the concepts of basic electronics and circuits.
- CO2:** Understand the different types of semiconductor devices and their characteristics.
- CO3:** Ability to design and analyze simple rectifiers and voltage regulators using diodes.
- CO4:** Demonstrate and implement the concept of PNP and NPN transistor.
- CO5:** Examine various electronic components including BJT, FET and MOSFET.
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### Course Contents

#### UNIT-I

**No. of Hours: 2**

Introduction of the conductor, semiconductor and insulators. Overview of the semiconductor materials like intrinsic and extrinsic semiconductors. Drift current, Diffusion current and mobility. Mechanism of current flow in semiconductors.

#### UNIT-II

**No. of Hours: 5**

Overview of the semiconductor diode and formation of depletion layer. Effect of temperature on barrier voltage, mechanism of current flow in PN junction diode. Voltage/ Current characteristics of PN junction diode. Temperature effect on V/I characteristics, ideal diode. Diode parameters like bulk resistance, static resistance and peak inverse voltage(PIV).

#### UNIT-III

**No. of Hours: 5**

Half wave rectifier and its derivation. Finding the input ac power, efficiency, voltage regulation and ripple factor of half wave rectifiers. Full wave rectifier classification. Overview of the Zener diode and understand V/I characteristics of Zener diode. Junction breakdown, avalanche breakdown, biasing, application of Zener diode as a voltage regulator, peak clipper and Zener diode as a meter protector.

#### UNIT-IV

**No. of Hours: 5**

PNP,NPN Transistor. Transistor biasing fixed bias circuit, emitter stabilized bias and voltage divider bias. Transistor behaviour on the basis of output characteristics, load line analysis and operating point (Q point)and factors affecting it.Transistor Configuration CB ,Characteristics of CB configuration ,Common emitter configuration, Characteristics of CE configuration Common collector ,Characteristics of CC configuration, Transistor behaviour on the basis of output characteristics, loadline analysis and operating point(Q point).

#### UNIT-V

**No. of Hours: 6**

Distortion, harmonic distortion and crossover distortion. Construction of FET and its biasing. Some characteristics regarding FET. Some definitions and regarding FET (shorted gate drain current, pinch of voltage).Some parameters regarding FET(AC drain resistance).Construction and working of

Depletion type MOSFET. Construction and working of Enhancement type MOSFET. Characteristics curve.

**Text Books:**

1. R. L. Boylestad & Louis Nashlesky , Electronic Devices & Circuit Theory, Pearson Education (2007)
2. David A. Bell , Electronic Devices and Circuits, Oxford University Press (2008).

**Reference Books:**

1. B L Theraja and AK Theraja, A Textbook Of Electrical Technology - Vol I.
2. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill (2002)

**Online Resources:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_ee55/preview](https://onlinecourses.nptel.ac.in/noc21_ee55/preview)

## CS-2020: Electronic Circuits - Practical

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### Course Outcomes (COs):

**CO1:** Apply and analyse the concepts of basic electronics and circuits.

**CO2:** Understand the different types of semiconductor devices and their characteristics.

**CO3:** Ability to design and analyze simple rectifiers and voltage regulators using diodes

**CO4:** Demonstrate and implement the concept of PNP and NPN transistor.

**CO5:** Examine various electronic components including BJT, FET and MOSFET.

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### Course Contents

**UNIT-I** **No. of Hours: 2**

Experiment No. 1: Study of the semiconductor devices

**UNIT-II** **No. of Hours: 2**

Experiment No. 2: To plot the characteristics of PN junction diode

**UNIT-III** **No. of Hours: 8**

Experiment No. 3: Study of half wave rectifier

Experiment No. 4: Study of full wave rectifier

Experiment No. 5: Study of zener diode as a voltage regulated

**UNIT-IV** **No. of Hours: 4**

Experiment No. 6: To plot the characteristics of transistor

**UNIT-V** **No. of Hours: 4**

Experiment No. 7: To plot the characteristics of FET

### Text Books:

1. R. L. Boylestad & Louis Nashlesky , Electronic Devices & Circuit Theory, Pearson Education (2007)
2. David A. Bell , Electronic Devices and Circuits, Oxford University Press (2008).

### Reference Books:

1. B L Theraja and AK Theraja, A Textbook Of Electrical Technology - Vol I.
2. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill (2002)

### Online Resources:

## CS-3208: OBJECT ORIENTED PROGRAMMING THROUGH C++ - II

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### Course Outcomes (COs):

**CO1:** Understand the fundamental concepts of Object-Oriented Programming.

**CO2:** Demonstrating OOP principles like abstraction, encapsulation, inheritance, and polymorphism.

**CO3:** : Implement constructors, destructors, and typecasting in C++ to manage memory and data efficiently.

**CO4:** Gain proficiency in using pointers, inheritance types, and virtual functions for advanced object-oriented design.

**CO5:** Explore advanced C++ features such as templates, file handling, and exception handling for robust application development.

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### Course Contents

#### UNIT-I

**No. of Hours: 8**

Introduction to OOP's Languages, Difference between procedure oriented and object oriented languages, characteristics of OOP's languages, application of OOP's, basic program structure, pre-processor directives. OOP's paradigm & concepts: Objects, Class, A sample C++ program with class, Defining member function, Introduction to- Data abstraction, Data encapsulation, Inheritance, polymorphism. Difference between structure and class.

#### UNIT-II

**No. of Hours: 8**

Scope resolution operator, Constructors and Destructors, Types of constructors: Default, Parameterized, copy constructors. . Data types in C++, Data type conversion and casting, explicit and implicit type conversion, Block, Local and Global variables, Qualifiers effecting scope and visibility of variables: Static, Auto, Extern and Register variables, Operators in C++, manipulators.

#### UNIT-III

**No. of Hours: 8**

Access specifiers in C++: Public, Private and Protected data member and member functions, Defining a member function of a class outside the class using scope resolution operator, inline functions, difference between macro, inline and simple function, Polymorphism: Function overloading, Operator overloading, Unary and Binary operator overloading, types of polymorphism: Compile time and Runtime Polymorphism

#### UNIT-IV

**No. of Hours: 8**

Pointers, this pointer, pointer to object, Pointer Arithmetic, Pointer to object. Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid inheritance, public, private and protected visibility in inheritance. Function overriding, pure virtual function Abstract class.

#### UNIT-V

**No. of Hours: 8**

Templates: Function template and class templates. Working with Files: Introduction to Classes for File Stream Operation, Opening & Closing Files, Detection of End of File, Working with Files, Exception Handling.

**Text Books:**

1. C++ : The Complete Reference by Herbert Schildt 4th Edition Mc-Graw Hill

**Reference Books:**

1. Let Us C++ - 2nd edition by Yashavant Kanetkar – BPB Publications
2. Balaguruswamy Object Oriented Programming With C++ Fourth Edition Tata McGraw Hill
3. The C++ Programming Language by Bjarne Stroustrup Addison-Wesley

**Online Resources:**

# CS-3208: OBJECT ORIENTED PROGRAMMING THROUGH C++ - II - PRACTICAL

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## Course Outcomes (COs):

- CO1:** Develop programs using basic syntax, data types, and control structures in C++.
- CO2:** Implement classes, objects, and member functions to demonstrate object-oriented principles.
- CO3:** Apply inheritance, polymorphism, and operator overloading to create modular and reusable code.
- CO4:** Work with pointers, dynamic memory allocation, and file handling for advanced problem-solving.
- CO5:** Create robust applications using exception handling, templates, and standard library functions.
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## Course Contents

### UNIT-I No. of Hours: 8

#### Basics of C++

1. Write programs to demonstrate the use of variables, data types, and operators.
2. Implement control structures like if-else, switch-case, loops, and nested loops.
3. Create simple programs using functions and pre-processor directives.

### UNIT-II No. of Hours: 8

#### Classes and Objects

1. Implement programs to define and use classes and objects.
2. Write programs to illustrate constructors (default, parameterized, copy) and destructors.
3. Develop programs to demonstrate the use of static members and member functions.

### UNIT-III No. of Hours: 8

#### Polymorphism and Overloading

1. Write programs to demonstrate function overloading and operator overloading.
2. Implement compile-time and runtime polymorphism using virtual functions.
3. Demonstrate the use of inline functions and scope resolution operators.

### UNIT-IV No. of Hours: 8

#### Inheritance and Pointers

1. Implement single, multiple, multilevel, and hybrid inheritance in C++.
2. Write programs to demonstrate the use of pointers with objects and this pointer.
3. Create applications using abstract classes and pure virtual functions.

### UNIT-V No. of Hours: 8

#### Templates and File Handling

1. Write programs using function templates and class templates.
2. Develop file handling programs to read and write data from files.

3. Demonstrate exception handling mechanisms in C++.

**Text Books:**

1. E. Balagurusamy, Object-Oriented Programming with C++, McGraw-Hill Education.
2. Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley.

**Reference Books:**

1. Herbert Schildt, C++: The Complete Reference, McGraw-Hill Education.
2. Robert Lafore, Object-Oriented Programming in C++, Sams Publishing.

**Online Resources:**

## IC-1905: ENGLISH LANGUAGE AND COMPOSITION

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### Course Outcomes (COs):

- CO1:** Enhance reading skills through extensive engagement with English literature.
- CO2:** Develop a strong foundation in basic language skills, including grammar and vocabulary.
- CO3:** Improve writing skills with an emphasis on clarity, coherence, and structure.
- CO4:** Strengthen critical thinking and analytical reading abilities.
- CO5:** Build effective oral communication skills for confident and persuasive expression.
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### Course Contents

<b>UNIT-I</b> Literature	<b>No. of Hours: 4</b>
<b>UNIT-II</b> Basic Language Skills	<b>No. of Hours: 4</b>
<b>UNIT-III</b> Vocabulary	<b>No. of Hours: 4</b>
<b>UNIT-IV</b> Sentence Structure	<b>No. of Hours: 4</b>
<b>UNIT-V</b> Composition and Paragraph Writing	<b>No. of Hours: 4</b>

### Text Books:

1. English Language and Literary Heritage of India - Foundation course (English Language) published by the Commission for Scientific and Technical Terminology and M.P. Hindi Granth Academy (Edition first, 2017).
2. English Usage - Michael Swan.

### Reference Books:

1. English Grammar and Composition - Wren and Martin

### Online Resources:

## IC-2927: ENVIRONMENTAL AWARENESS

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### Course Outcomes (COs):

**CO1:** Basic knowledge of environment and its components.

**CO2:** Ability to understand environmental degradation and ecosystem.

**CO3:** Knowledge regarding environmental pollution and their effects to the world.

**CO4:** Exposure to planning and management of environment.

**CO5:**

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### Course Contents

#### UNIT-I

**No. of Hours: 4**

Environment meaning, structure and type of environment, components of environment, society and resources. Man-environment relationship: Approach to study man interaction with environment (historical to present day).

#### UNIT-II

**No. of Hours: 4**

Environmental degradation: Meaning of degradation, types of degradation, process of degradation, cause of degradation, Religious and philosophical factors, deforestation, agricultural development and degradation, population growth and degradation, urbanization and degradation, modern technology and degradation.

#### UNIT-III

**No. of Hours: 4**

Ecology: Definition of ecology and ecosystem. Types of ecosystem, components of ecosystem, functions of ecosystem, productivity and stability of ecosystem. Environmental disasters: Meaning and concepts, types of hazards and disaster, man-induced and natural hazards, global warming, ozone depletion, greenhouse effect and other major environmental problems.

#### UNIT-IV

**No. of Hours: 4**

Environmental pollution: Air, water, solid, noise pollution. Meaning, definition, sources, types, adverse effects and methods of control.

#### UNIT-V

**No. of Hours: 4**

Environmental planning and management: Concepts, aspects and approaches, resources management, ecological management. Biosphere reserves, management of wild life. Environmental regulation and rules, Vision of Environment by Govt. of India, Environmental policy, waste disposal rules and laws and legislation enacted by Parliament for environmental protection.

#### Text Books:

1. Environmental Awareness: Dr. Dhananjay Verma, Published by: Madhya Pradesh Hindi Granth Academy.

**Reference Books:**

**Online Resources:**