# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
# Shri Vaishnav Institute of Information Technology
# Choice Based Credit System (CBCS) in Light of NEP-2020
# B.Tech. (CSE- Artificial Intelligence and Machine Learning-Microsoft)SEMESTER-I (2021-2025)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | L | T | P | CREDITS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | | | | |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment * | END SEM University Exam | Teachers Assessment * | | | | |
| BTMACS 101 | BS | Mathematics-I | 60 | 20 | 20 | 0 | 0 | 3 | 1 | 0 | 4 |

**Legends**: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

**The student will have ability to:**

1. To introduce the students with the Fundamentals of the Differential, Integral, Vector Calculusand Numerical Analysis.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Understand and apply the basics of the differential calculus.
2. Know the fundamental principles of the integral calculus and apply them.
3. Apply the techniques in the numerical analysis.
4. Know the numerical solution of the system of linear algebraic equations.
5. Understand and apply the basics of the vector calculus.

**Syllabus:**

**UNIT I** **10HRS**

**Calculus of Matrices:** Systems of linear equations and their solutions.Matrices, determinants, rank and inverse.Linear transformations. Range space and rank, null space and nullity. Eigenvalues and eigenvectors.Similarity transformations.Diagonalization of Hermitian matrices.

**UNIT II** **9HRS**

**Integral Calculus :**Riemann integration, fundamental theorem of integral calculus, improper integrals.Application to length, area, volume, surface area of revolution. Multiple integrals with application to volume, surface area, Change of variables.

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**UNIT III** **8HRS**

**Numerical Analysis**

**Number Representation and Errors:** Numerical Errors; Floating Point Representation; Finite Single and Double Precision Differences; Machine Epsilon; Significant Digits.

**Numerical Methods for Solving Nonlinear Equations:** Method of Bisection, Secant Method, False Position, Newton Raphson's Method, Multidimensional Newton's Method, Fixed Point Method and their convergence.

**UNIT IV** **7HRS**

**Numerical Methods for Solving System of Linear Equations:** Norms; Condition Numbers, Forward Gaussian Elimination and Backward Substitution; Gauss Jordan Elimination; FGE with Partial Pivoting and Row Scaling; LU Decomposition; Iterative Methods: Jacobi, Gauss Siedal; Power method and QR method for Eigen Value and Eigenvector.

**UNIT V** **8HRS**

**Vector Calculus: Gradient** and directional derivative. Divergence and Curl of Vector point function, line and surface integrals. Green‟s, Gauss‟ and Stokes‟ theorems and their applications.

**Text Books:**


1. T. M. Apostol, Calculus, Volume I, 2nd Ed, Wiley, 1967.
2. T. M. Apostol, Calculus, Volume II, 2nd Ed, Wiley,1969.
3. K. E. Atkinson, Numerical Analysis, John Wiley, Low Price Edition(2004).
4. S. D. Conte and C. de Boor, Elementary Numerical Analysis An Algorithmic Approach, McGraw□Hill,2005.
5. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers,Delhi

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**References:**


1. R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 5th Ed, Wiley,1999.
2. J. Stewart, Calculus: Early Transcendentals, 5th Ed, Thomas Learning (Brooks/ Cole), IndianReprint,2003.
3. J. Stewart, Calculus: Earl Transcendentals, 5th Ed, Thomas Learning (Brooks/ Cole), IndianReprint,2003.
4. J. D. Hoffman, Numerical Methods for Engineers and Scientists, McGraw□Hill, 2001.
5. M.K Jain, S.R.K Iyengar and R.K Jain, Numerical methods for scientific and engineering computation (Fourth Edition), New Age International (P) Limited, New Delhi,2004.
6. S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists,McGraw Hill2008.

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| BTPH101 | BS | Applied Physics | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 2 | 5 |

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**Course Educational Objectives (CEOs):**

1. To develop the comprehensive understanding of laws of physics.
2. To develop ability to apply laws of physics for various engineering applications.
3. To develop the experimental skills, ability to analyze the data obtained experimentally to reachsubstantiated conclusions.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Comprehend laws of physics.
2. Student will be able to apply laws of physics for various engineering applications.
3. Student will be able to determine physical parameter experimentally and will be able to analyze the data obtained experimentally to draw substantiate conclusions.

**Syllabus:**

**UNIT I** **10HRS**

**Quantum Physics:** Introduction to Quantum hypothesis, Matter wave concept, Wave Group and Particle velocity and their relations, Uncertainty principle with elementary proof and applications to microscope and single slit, Compton Effect, Wave function and its physical significance. Development of time dependent and time independent Schrodinger wave equation, Applications of time independent Schrodinger wave equation.

**UNIT II** **9HRS**

**Solid State Physics:** Free electron model, Qualitative Analysis of Kronig Penney Model, Effective mass, Fermi level for Intrinsic and Extrinsic semiconductors, P-N junction diode, Zener diode, Tunnel diode, Photodiode, Solar- cells, Hall Effect, Introduction to Superconductivity, Meissner effect, Type I & II Superconductors

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**Unit-III** **8HRS**

**Nuclear Physics:** Nuclear Structure & Properties Nuclear models: Liquid drop with semi-empirical mass formula & shell model. Particle accelerators: Cyclotron, Synchrotron, Betatron. Counters and Detectors: Giger-Muller counters, Bainbridge Mass Spectrograph and Auston Mass Spectrograph.

**UNIT IV** **7HRS**

**Laser & Fiber Optics:** Stimulated and Spontaneous Emission, Einstein‟s A&B Coefficients, Population Inversion, Pumping, Techniques of Pumping, Optical Resonator, Properties and Applications of Laser, Ruby, Nd:YAG, He-Ne lasers.

Introduction to Optical fibre, Acceptance angle and cone, Numerical Aperture, V- Number, Ray theory of propagation through optical fibre, Pulse dispersion , applications of optical fibre.

**UNIT V** **8HRS**

**Wave Optics:** Introduction to Interference, Fresnel's Bi-prism, Interference in Thin films, Newton's rings experiment, Michelson‟s interferometer and its application, Introduction to Diffraction and its Types, Diffraction at single slit, double slit, resolving power, Rayleigh criterion, Resolving power of grating, Concept of polarized light, Double refraction, quarter and half wave plate, circularly & elliptically polarized light.

**Textbooks:**


1. Engineering Physics by Dr. S. L. Gupta and Sanjeev Gupta, DhanpatRai Publication, NewDelhi.
2. Engineering Physics by Navneet Gupta, DhanpatRai Publication, NewDelhi.
3. Engineering Physics by H. J. Sawant, Technical Publications, Pune,Maharastra.
4. Engg Physics by M.N. Avdhanulu& P.G. Kshirsagar, S.Chand&Co.Edition(2010).
5. Fundamentals of Physics by Halliday, Wiley,India.

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**References:**


1. Concepts of Modern Physics by Beiser, TMH, New Delhi.
2. Solid State Physics by Kittel,Wiley India.
3. Atomic and Nuclear physics by Brijlal and Subraminiyan.
4. LASERSs and Electro Optics by Christopher C. Davis, Cambridge Univ. Press (1996).
5. Optroelectronics an Introduction by J. Wilson &J.F.B.Hawkes, “” Prentice-Hall II Edition.


**List of Experiments:**

1. Measurement of radius of curvature “R” of convex lens by Newton‟s ringexperiment.
2. Measurement of Numerical aperture of fiber byLASER.
3. Determination of Energy band gap „$E_g$‟ of Ge using Four Probemethod.
4. Measurement of Frequency of A.C. mains by electrically maintained vibratingrod.
5. Measurement of Resolving Power of Telescope.
6. Measurement of “λ” of LASER light source using Diffraction Grating.
7. Determination of Planck‟s constant by using photocell.
8. Determination of Energy band gap ($E_g$) using PN Junction Diode.
9. To determine the mass of cane sugar dissolved in water using half shade polarimeter.
10. To study forward and reverse characteristics of Zener diode.
11. To study forward and reverse characteristics of P-Ndiode.
12. To study characteristics of Photodiode.
13. To study characteristics of LDR.
14. μ and ω of given prism using spectrometer.
15. Measuring height of a given object using Sextant.
16. LASER theory and applications by A. K. Ghatak&Tyagarajan, TMH(1984). Optics by Ghatak,TMH.

| Chairperson | Chairperson | Controller of Examination | Joint Registrar |
|---|---|---|---|
| Board of Studies | Faculty of Studies | Shri Vaishnav Vidyapeeth | Shri Vaishnav Vidyapeeth |
| Shri Vaishnav Vidyapeeth | Shri Vaishnav Vidyapeeth | Vishwavidyalaya, Indore | Vishwavidyalaya, Indore |
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| BTEC104 | DC | Digital Logic & Circuit Design | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 2 | 5 |

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## Course Educational Objectives (CEOs):

The objective of this course is to:

1. Use of Boolean algebra and Karnaugh Map to simplify logic function.
2. Describe the operation of different Combinational and Sequential Logic Circuits.

## Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes.

The students will be able to

1. Design an optimal digital logic circuit to meet the given specifications.
2. Evaluate the performance of the given digital logic circuit based on specific criteria for reliablesystem implementation.

## Syllabus

**UnitI** **10HRS**

**Number System & Codes:** Introduction to number systems, Binary numbers, Octal & Hexadecimal Numbers, Number base Conversion, Signed binary numbers: 1"s Complement & 2"s Complement representation and their arithmetic operation, Floating point representation, binary codes, BCD,ASCII, EBCDIC, Gray codes, Error detecting and Correcting codes, Hamming codes.

**UnitII** **9HRS**

**Boolean algebra and Logic gates:** Introduction, Logic operations, Axioms and laws of Boolean algebra, Demorgan"s theorem, Boolean functions, Canonical and standard forms. Logic gates and their applications, universal gates, NAND-NOR implementation of logic functions. Minimization techniques for logic functions-K-map, Tabular / QuineMcCluskey method.

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**Unit-III** **8HRS**

**Combinational logic:** Arithmetic circuits- Half adder, Full adder, Halfsubtractor, Full subtractor, Parallel and Serial adder, BCD adder, Multiplexer, De-multiplexer, Encoder & Decoder.

**Unit-IV** **7HRS**

**Sequential logic:** Introduction, Latch and Flip Flop- S-R, D, JK and T, State diagram, characteristic equation, state table and excitation table, Flip flop conversion, applications of Flip flop, Counters, Registers

**Unit-V** **8HRS**

**Semiconductor Memories and A/D and D/A converters:** Semiconductor Memory – RAM, ROM- Organization, operation and their Types, PLD- PAL, PLA, PROM, FPGA, Analog to Digital (A/D) and Digital to Analog (D/A) converters and their types.

**Textbooks:**


1. M. Morris Mano,"Digital Logic and Computer Design", Pearson Education, 2016.
2. S Salivahanan and S Arivazhagan: Digital Circuits and Design,4th Edition, VikasPublishing House,2012.


**References:**


1. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI,2016.
2. Floyd and Jain,"Digital Fundamentals", 10th Edition, Pearson Education India,2011.
3. Roland J.Tocci,Widmer,Moss, "Digital Systems Principles and Applications", 10th Edition, Pearson2009.
4. Stephen Brown, ZvankoVranesic, "Fundamentals of Digital Logic Design", 3rd Edition, McGrawHill, 2017.

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**List of Experiments:**

1. To study and test of operation of all logic gates for various IC‟s(IC7400,IC7403,IC408,IC74332,IC7486).
2. Verification of DeMorgan‟s theorem.
3. To construct of half adder and fulladder.
4. To construct of half subtractor and full subtractor circuits.
5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Design a BCD to excess 3codeconverter.
8. Design a Multiplexer/Demultiplexer
9. Analysis of various flip flops with Preset and Clear capability.
10. Design of Johnson and Ring counter.
11. Design of synchronous and asynchronous up/down counters.

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| **BTCS101N** | **DC** | **Introduction to Computer Science and Engineering** | **60** | **20** | **20** | **0** | **50** | **2** | **0** | **2** | **3** |

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## Course Educational Objectives (CEOs):

1. To introduce the fundamentals concepts of Computer system.
2. To introduce about history of Computer.
3. Understanding the basic concepts and features of various kinds of Operating systems.
4. Learning the Concepts of Office Automation Tools.

## Course Outcomes (COs):

The students will be able to

1. Understand the basic terminologies of Computer System.
2. Gain knowledge about various kinds of Operating Systems and their features.
3. Learn the Concepts of Office Automation Tools.

## Syllabus

### Unit-I 10HRS

**Introduction to Computer Fundamentals**: Introduction to Computer, Objectives, Hardware and Software, Block Diagram of the Computer, Functions of the different Units, Applications of Computers Representation of data and information, Computer Languages, Machine language, Assembly Language, High level Language, Number System and Conversion, Classification and History of Computers, Introduction to Free and Open-Source Software, Computer Virus, Use of Antivirus software.

### Unit-II 8HRS

**The Operating System**: The Graphical User Interface (GUI), Definition of Operating System, Objective, Types and Functions of Operating Systems, Windows Operating System, Installing MS Windows, Working with Windows Operating System, System Tools and Applications in Windows, MS-DOS, Basic DOS commands, Comparison of DOS and Windows, case study of Unix, Linux OS.

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**Unit-III** **9HRS**

**Office Automation Tools-I**: Word Processing Basics, Elements of word Processing and Working Objectives, MS-Word Screen and its Components ,MS-Office ,Working with MS-Word, Menu Bar, Creating Documents, Using Templates, Saving a documents, Working with documents, Setting up pages of a document, Printing Documents with different options, Using Tables and Columns, Object Linking and Embedding, Hyperlink, Envelopes & Label Creation, Grammar & Spell Check, Mail Merge, Macro Creation, Previewing and Printing Documents.

**Unit-IV** **7HRS**

**Office Automation Tools-II** Spread Sheet: Introduction to MS-Excel, Starting MS-Excel, Basics of Workbook and Spreadsheet, MS-Excel Screen and Its Components, Features of Excel, Elementary Working with MS-Excel, Manipulation of cells, Formatting of Spreadsheet and Cells, Formulas and Functions, spread sheets for Small accountings, Previewing and Printing a Worksheet.

**Unit-V** **8HRS**

**Office Automation Tools-III** Power-point: Introduction to MS-PowerPoint, Basics of PowerPoint, MS- PowerPoint Screen and Its Components, Features of PowerPoint, Elementary, Elementary Working with MS-PowerPoint, Preparation of Slides, Creation of Presentation, Providing aesthetics, Slide Manipulation and Slide Show, Presentation of the Slides.

**Text Books:**


1. E Balagurusamy , “Fundamentals of Computers ”,TMH .
2. Silakari and Shukla, “Basic Computer Engineering ”, Wiley India.
3. V. Rajaraman, Neeharika Adabala, “Fundamentals of Computers”, PHI
4. Ajoy Kumar Ray and Tinku Acharya ,“ Basic Computer Engineering”, PHI.
5. P K Sinha ,“Fundamentals of Computers ” , BPB Publications.

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**References:**


1. J. P. Tremblay and R.B. Bunt, "An Introduction of Computer Science –An Algorithmic Approach",TMH.
2. Faithe Wempen , "Computing Fundamentals: Introduction to Computers ", Wiley.
3. Norton, Peter, "Introduction to Computers", Fourth revised ,Mc-Graw-Hill.
4. Reema Thareja , "Fundamental of Computers", Oxford University Press.


**List of Experiments:**

1. Study and Perform different MS –DOS Commands (Internal and External).
2. Create the "test" directory in the directory you are currently in using MS-DOS.
3. Study of Word – Templates, Styles.
4. Create a new user and give it Administrator privilege for Microsoft windows OS.
5. Create a MS-Word .doc file contain your complete CV.
6. Study and perform different Excel Commands/Functions.
7. Perform MS-Excel Accounting.
8. Create a MS-Excel .xls file contain mark sheet.
9. Display the student's result into a chart using MS-Excel.
10. Create a MS-Power Point Presentation .ppt file covers the topic "Computer's Evolution".
11. Create a MS-Power Point Presentation .ppt file covers the topic "social responsibility".
12. Create a MS-Access database .mdb file to store the results of students.

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## Course Educational Objectives (CEOs):

The student will have ability to:

1. Identify situations where computational methods and computers would be useful.
2. Give a computational problem, identify and abstract the programming task involved.
3. Approach the programming tasks using techniques learned and write pseudo-code.
4. Choose the right data representation formats based on the requirements of the problem.
5. Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
6. Write the program on a computer, edit, compile, debug, correct, recompile and run it.
7. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.

## Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes. The students will be able to

1. Understand the basic terminologies used in computer programming.
2. Proficient in using the basic constructs of C, to develop a computer program
3. Understand the use of functions, pointers, arrays and files in programming.
4. Understand the fundamentals of procedure-oriented programming and be able to apply it in computer program development.

## Syllabus

**UNIT I** **7HRS**

**Introduction to Programming Languages:** Evolution of Programming Languages, Structured Programming, The Compilation Process, Object Code, Source Code, Executable Code, Operating Systems, Interpreters, Linkers, Loaders, Fundamentals Of Algorithms, Flowcharts.

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**UNIT II** **10HRS**

**Introduction to 'C' Language:** Character Set. Variables and Identifiers, Built-In Data Types. Variable Definition, Arithmetic Operators and Expressions, Constants and Literals, Simple Assignment Statement, Basic Input/ Output Statement, Decision Making Within A Program, Conditions, Relational Operators, Logical Connectives, If Statement, If-Else Statement, Loops: While Loop, Do While, For Loop. Nested Loops, Switch Statement.

**UNIT III** **8HRS**

**Arrays and Pointers: Array Manipulation;** Searching, Insertion, Deletion of an Element from one dimensional Array; Finding the Largest/Smallest Element in an Array; Two Dimensional Arrays, Addition/Multiplication of Two Matrices, Transpose of a Square Matrix, Address Operators, Pointer Type Declaration, Pointer Assignment, Pointer Initialization, Pointer Arithmetic, Pointer Arrays.

**UNIT IV** **7HRS**

**Functions:** Modular Programming and Functions, Prototype of a Function: Parameter List, Return Type, Function Call, Block Structure, Call by Reference, Call by Value, Recursive Functions and Arrays as Function Arguments

**UNIT V** **8HRS**

**Structure:** Structure Variables, Initialization, Structure Assignment, Structures and Arrays: Arrays of Structures. 8HRS

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**Textbooks:**

1. Gottfried BS – Programming with C, TMH publications.
2. David Griffiths**, "**Head First C: A Brain-Friendly Guide**"** O Reilly Media Inc. 2011.
3. Allen B. Tucker, "Programming Languages", Tata McGraw Hill.
4. Tennence W.Pratt, "Programming languages design and implementation", Prentice Hall of India.

**References:**

1. Herbert Schildt "C: Complete Reference", Tata McGraw Hill 2000.
2. Yashwant Kanetkar, "Let us C", BPB Publication, 16th Edition 2018.
3. Fundamentals of Programming Languages, R. Bangia,Cyber Tech .
4. Greg Perry and Dean Miller, "C Programming Absolute Beginner's Guide 3rd Edition", Que Publishing 2013.

**List of Experiments:**

1. Write a C program to display "This is my first C Program".
2. Write a C program to calculate area and circumference of a circle.
3. Write a C program to perform addition, subtraction, division and multiplication of two numbers.
4. Write a program to calculate simple and compound interest.
5. Write a program to swap values of two variables with and without using third variable.
6. Write a program to display the size of every data type using "sizeof" operator.
7. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
8. Write a program to input two numbers and display the maximum number

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9. Write a program to find the largest of three numbers using ternary operators.
10. Write a program to find the roots of quadratic equation.
11. Write a program to input name, marks of 5 subjects of a student and display the name of the student, the total marks scored, percentage scored and the class of result.
12. Write a Program to Check Whether a Number is Prime or not.
13. Write a program to find the largest and smallest among three entered numbers and display whether the identified largest/smallest number is even or odd.
14. Write a program to find the factorial of a number.
15. Write a program to check number is Armstrong or not.
    a. (Hint: A number is Armstrong if the sum of cubes of individual digits of a number is equal to the number itself).
16. Write a program to check whether a number is Palindrome or not.
17. Write a program to generate Fibonacci series.
18. Write a program to find GCD (greatest common divisor or HCF) and LCM (least common multiple) of two numbers.
19. Write a Program to Search an element in array.
20. Write a Program to perform addition of all elements in Array.
21. Write a Program to find the largest and smallest element in Array.
22. Write a Program for deletion of an element from the specified location from Array.
23. Write a Program to access an element in 2-D Array.
24. Write a program for addition of two matrices of any order in C.
25. Write a Program to multiply two 3 X 3 Matrices.
26. Write a program to add, subtract, multiply and divide two integers using user-defined type function with return type.
27. Write a program to generate Fibonacci series using recursive function.
28. Write a program to find the sum of all the elements of an array using pointers.

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29. Write a program to swap value of two variables using pointer.
30. Write a program to add two numbers using pointers.
31. Write a program to input and print array elements using pointer.
32. Write a program to create a structure named company which has name, address, phone and noOfEmployee as member variables. Read name of company, its address, phone and noOfEmployee. Finally display these members‟ value.
33. Write a program to read RollNo, Name, Address, Age & average-marks of 12 students in the BCT class and display the details from function.

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**Course Educational Objectives (CEOs):**

1. To introduce the fundamentals concepts Python Programming.
2. To understand the concepts and loops & functions in Python.
3. To impart Data Analytics Concepts using different libraries of python

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to

1. Understand Python programming language syntax and semantics.
2. Proficient in computer programming concepts like data types and variables.
3. Understand the use of programming concepts like conditional execution, loops & functions.
4. Understand the use of data analysis techniques using Numpy and Pandas.
5. Understand the use of data visualization techniques using Matplotlib and Seaborn.

**Syllabus:**

**UNIT I** **10HRS**

**Python:** About Python Programming, Python History, Installing Python, Python Variables, Python Keywords, Python Identifiers, Python Statement, Multi-line statement , Python Indentation, Python Comments ,Multi-line comments, Python Operators, Decision making, Decision making, If Statement , If-Els, Elif statement , Nested If , Loop ,Different types of Loops , for loop, while loop, Loop Control Statements, break statement, continue statement ,pass, Nested Loops.

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**Unit II** **9 HRS**

**Python**

Python Data Structure , List, Tuple, Dictionary, Sets. What is Function, Types of Arguments, Docstrings, Python Module, Python packages. Input / Output Operation, Python String, Creating String in Python, Strings indexing and splitting, Reassigning Strings, Deleting the String, Strings Library function, Exception Handling, Syntax Errors, Exceptions, Handling Exceptions, Handling Exceptions (Try-Except), Handling Exceptions (Try-Except-Else), Handling Exceptions (Try-Finally), Raising Exception.

**UNIT III** **9 HRS**

**Numpy**

Python list vs NumPy arrays, Creating a NumPy Array, Basic ndarray, Shape of NumPy array, Size of NumPy array, Array of zeros, Array of ones, Random numbers in ndarray, The Shape and Reshaping of NumPy Array, Dimensions of NumPy array, Reshaping a NumPy array, Flattening a NumPy array, Transpose of a NumPy array, Indexing and Slicing of NumPy Array, NumPy Ufuncs, Maths with NumPy Arrays, Mean, Median and Standard deviation, Min-Max values and their indexes, Sorting in NumPy Arrays, NumPy Arrays and Images.

**UNIT IV** **8 HRS**

**Pandas**

Pandas Series, Pandas DataFrames, Common Operations in Pandas, How To Deal With Missing Data in Pandas, How To Merge DataFrames in Pandas, How To Join DataFrames in Pandas, How To Concatenate DataFrames in Pandas. Data Input and Output in Pandas, How To Save Pandas DataFrames. Data visualization.

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**UNITV** **9 HRS**

**Matplotlib and Seaborn**

Installing Matplotlib , Line Chart, Scatter Plot ,Bar Graph, Histogram, Subplots , Pie Chart , Matplotlib with Pandas and Numpy. specify color, markings and line styles, adjust thickness, label

and legend, save the graph, legend (), title(). Installing Seaborn, Load Datasets To Construct Seaborn Plots, Histogram, Bar Plot, Count Plot, Joint Plot, Regplot, Lm Plot, KDE Plot, Box Plot, Violin Plot, Heatmap, Pair Plot.

**Text Books:**


**1.** Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage learning, second edition, 2018.

2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson publisher, 2018.


**References:**


1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press, Nov 2018.
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson, 2012.
3. “Think Python: An Introduction to Software Design”, Allen B. Downey, Green Tea Press, 2009.
4. “Head First Python”, Paul Barry, O’REILLY.
5. Python Documentation - https://docs.python.org/3.8/.
6. NumPy Documentation - https://numpy.org/doc/.
7. Pandas Documentation - https://pandas.pydata.org/docs/.
8. Matplotlib Documentation - https://matplotlib.org/3.4.3/contents.html.
9. Seaborn Documentation - https://seaborn.pydata.org/.

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**LIST of EXPERIMENTS:**

1. WAP to take first name and Last name using input function from user and display full name.
2. WAP to take 2 numbers from user and display addition.
3. WAP to calculate the area of Rectangle.
4. WAP to calculate the area of Square.
5. WAP to calculate the area of cuboid.
6. WAP to calculate the addition of digits for the given number x =531 without using any loop, you have to use only Arithmetic operator.
7. WAP to check that given number is even.
8. WAP to check that given number is even or odd.
9. WAP to check the person completed the age of 18, if not so how many years remaining to complete 18.
10. WAP to check the given number is negative, positive or zero.
11. WAP to check the number is divided from 3 and 5 both".
12. WAP to print for loop with list (String).
13. WAP to print for loop with list (Numeric).
14. WAP to print for loop with string.
15. WAP to print 1 to 10 number using range ().
16. WAP to print the table of 5.
17. WAP to print the table of 5 in format 5 x 1 = 5 , 5 x 2 = 10.
18. WAP to print even number between 323 to 360.
19. WAP to print and count even number between 323 to 360.
20. WAP to print count and sum even number between 1 to 10.