| Course Code | Title | | |
|---|---|---|---|
| 21U3CKC101 / 22U3CKC101 | Core Paper I: Python Programming | | |
| Semester: I | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |
| (Common to B. Sc. IT / AIML / BCA) | | | |
| Course Objective | To develop algorithmic solutions to simple computational problems using Python | | |
| Course Category | Employability | | |
| Development Needs | Global | | |
| Course Description | Python is a versatile programming language that can be used in a variety of fields, such as software development, government administration, business, science, arts, education, and others | | |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Understand the basics of Python and write simple python program. | Lecture / Demonstration / Flipped Classroom | Assignment |
| CO 2 | Develop Python programs with Control Statement and List method. | Demonstration / Constructivist Approach/ Tutorial | Seminar |
| CO 3 | Apply Tuples, Functions and Set Iterators to develop simple applications | Lectures / Demonstration / Video Lessons | Quiz |
| CO 4 | Apply Python Strings, Multithreading and Exceptions for problem solving. | Tutorial / Demonstration / Case Studies | Program Execution |
| CO 5 | Manipulate Files and perform Event Handling. | Lecture / Demonstration / Class Projects | Program Execution |

| Offered by | Information Technology |
|---|---|

| Course Content | Instructional Hours / Week : 4 |
|---|---|

| Unit | Description | Text Book | Chapters |
|---|---|---|---|
| I | **Fundamentals of Python Programming:** Introduction – Features – Applications – Installation-Sample Program-Python Virtual Machine-Memory management in Python-Comparison between C, Java and Python- Keywords, Identifiers, Statements, Indentation. Syntax and Styles: Data Types – Literals – Variables-Operators and Expressions-Evaluation of Expression-Sample Programs. | 1 | 1,2 |
| | **Instructional Hours** | | 12 |
| **Suggested Learning Methods: Video lectures about the basics of Python Programming** | | | **02 Hrs** |
| II | **Control Flow:** If – While – For – Break – Continue-Pass-Entry Controlled Loop - Exit Controlled Loop – Counter Controlled Loop - Condition Controlled Loop - Nested Loop - Sample Programs. Arrays-Sequences - Python Lists: Read a List type from a Keyboard-Accessing Elements of a List- Modifying Elements of a List – Basic Operations - Built-in Functions – Python List Methods. | 1,2 | 3,4,5,9 |

| | | | |
|---|---|---|---|
| | **Instructional Hours** | | 12 |
| | **Suggested Learning Methods: Practice using Flow Charts** | | **02 Hrs** |
| **III** | Tuples -Need of a Tuple-Sequence of Unpacking – Methods –Sample programs.Dictionaries: Making a Dictionary-Basic Operations-Dictionary Operations – Sets-Iterators and Generators – Sample Programs. Functions: Defining Functions-Calling Functions-Passing Arguments-Keyword Arguments-Default Arguments-Required Arguments-Variable Length Arguments-Return Statements-Nesting of Passing Arguments-Anonymous Functions-Recursive Functions-Scope of Local and Global Variables. | 1 | 6,7,8 |
| | **Instructional Hours** | | 12 |
| | **Suggested Learning Methods: Develop small programmes using tuples** | | **02 Hrs** |
| **IV** | **Strings in Python:** Reading – Accessing – Modifying – Finding - Iterating through a String - Build-in String Functions. Errors and Exceptions – Multithreading | 2 | 8 |
| | **Instructional Hours** | | |
| | **Suggested Learning Methods: Develop small applications** | | **02 Hrs** |
| **V** | **Files and Directory Access:** Files and Streams - Opening a File - Reading/Writing Operations in a File - Other operations in a File - Iterating through a File - Splitting Words - Serialization and Deserialization. Events: Event Objects - Binding callbacks to events - Event names - Keyboard events - Mouse Events - Sample Programs | 1 | 13,17 |
| | **Instructional Hours** | | 12 |
| | **Suggested Learning Methods: Laboratory practice** | | **02 Hrs** |
| | **Total Hours** | | 60 Hrs |

| | |
|---|---|
| **Text Books** | 1. Ch.Satyanaryana, M.Radhika Mani, B.N. Jagadesh, Python Programming, University Press Pvt. Ltd.2018.<br>2. Dr.S.A.Kulkarni, Problem Solving and Python Programming, 2nd Edition, Yesdee Publishing,2018 |
| **Reference Books** | 1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers,2016<br>2. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.,2011. |
| **Web. URLs** | |

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | H | H | H | L | M | M | - | - | M | H | H | M | M |
| CO2 | M | M | M | M | H | M | - | - | H | H | H | M | H |
| CO3 | H | L | M | H | M | M | - | - | M | H | H | M | M |
| CO4 | M | H | L | M | L | L | - | - | H | M | H | H | M |
| CO5 | M | M | H | H | M | H | - | - | H | H | M | H | H |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKC102 / 22U3CKC102 | Core Paper II: Digital Fundamentals and Computer Architecture | | |
| Semester: I | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |
| (Common to B. Sc. CS / IT / BCA) | | | |
| Course Objective | To enable the students to know about the Operations in digital computer, Boolean algebra, CPU Architecture, memory design and its functionality | | |
| Course Category | Skill Development /Employability/Entrepreneurship | | |
| Development Needs | Global | | |
| Course Description | Understand Number Conversion, the concept of I/O organization and logic circuits. Analyze memory organization and multiprocessor in digital computers. | | |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Perform number conversion and identify the logic gates. | Lecture, Problem Based Teaching and Tutorial | Quiz |
| CO 2 | Design basic combinational logical circuit. | Lecture Demonstration | Quiz |
| CO 3 | Understand the concept of I/O organization | Video Lessons | Assignment |
| CO 4 | Apply priority to interrupts and use it for data transfer. | Lecture, Tutorial | Assignment |
| CO 5 | Analyse memory organization and multiprocessor in digital computers. | Lecture, Tutorial | Seminar |

| Offered by | Computer Science |
|---|---|

| Course Content | Instructional Hours / Week: 4 |
|---|---|

| Unit | Description | Text Book | Chapters |
|---|---|---|---|
| I | **Digital Logic – Digital Operations - Digital Computers.** **Number System and Binary Codes:** Decimal, Binary, Octal, Hexadecimal Binary addition, Multiplication, Division – Floating point representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half adder, Full adder, Parallel binary adder, BCD adder, Serial Adder, Half subtractor, Full subtractor, Parallel binary subtractor- Digital Logic: The Basic Gates –NOR, NAND, XOR Gates. | 1,2 | 1,3,4 |
| | | **Instructional Hours** | **12** |
| | **Suggested Learning Methods: Number System Problem Solving** | | **3** |
| II | **Combinational Logic Circuits:** Boolean algebra-Karnaugh map – Canonical form 1 – Construction and properties –Implicants – Don‘t care combinations - Product of sum, Sum of products, simplifications. Sequential circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder -Encoder – shift registers-Counters | 1,2 | 2,5,6 |
| | | **Instructional Hours** | **12** |
| | **Suggested Learning Methods: Video Presentation** | | **3** |
| III | **Input – Output Organization:** Input – output interface – I/O Bus and Interface – I/O Bus Versus Memory Bus – Isolated Versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous data transfer: Strobe Control and Handshaking- Modes of Transfer | 3 | 11 |
| | | **Instructional Hours** | **12** |

| | | | |
|---|---|---|---|
| | **Suggested Learning Methods: Report Preparation** | | **2** |
| **IV** | **Priority Interrupt:** Daisy- Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication-Serial Communication-Character Oriented Protocol, Data Transparency, Bit Oriented Protocol. | 3 | 11 |
| | **Instructional Hours** | | **12** |
| | **Suggested Learning Methods: Report Preparation** | | **2** |
| **V** | **Memory Organization**: Memory Hierarchy – Main Memory-Associative memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-associative Mapping – Writing into Cache Initialization. **Multiprocessor: Interconnection** Structure, Interprocessor Arbitration, Interprocessor Communication and Synchronization. | 3 | 12 |
| | **Instructional Hours** | | **12** |
| | **Suggested Learning Methods - Video Presentation** | | **3** |
| | **Total Hours** | | **60** |

| | |
|---|---|
| **Text Books** | 1. V.K. Puri&Henry **Digital Electronics Circuits and Systems**, TMH, 1997.<br>2. M. Morris Mano, **Computer System Architecture**, PHI publications<br>**Unit I:** Sections: 1.1.3 to 1.1.8, 1.1.10 – 1.1.14, 1.4.2 to 1.4.5, 1.4.7 to 1.4.9, 1.2.2, 1.2.6 to 1.2.7, 1.2.9 (Text book 1: Chapter 1)<br>**Unit II:** Sections: 1.2.1, 1.2.11 to 1.2.15, 1.2.17 to 18, 1.5.1 to 1.5.3, 1.5.6, 1.5.9 to1.5.10, 1.6.2 to1.6.9 (Text book 1: Chapter 1)<br>**Unit III:** Sections: 11.2 to 11.4 (Text book 2: Chapter 11)<br>**Unit IV:** Sections: 11.5 to 11.8 (Text book 2: Chapter 11)<br>**Unit V:** Sections: 12.1, 12.2, 12.4, 12.5, and 13.2 to 13.4(Text book 2: Chapter 12 and 13) |
| **Reference Books** | 1. M. Carter, Computer **Architecture**, Schaum'S Outline Series, TMH, 1996. |
| **Web. URLs** | https://www.educba.com/digital-computer-fundamentals/ |

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | H | H | | M | M | | M | H | H | H | H | M | M |
| CO2 | H | H | | M | M | | M | H | H | H | H | M | M |
| CO3 | H | H | | M | M | | M | H | H | H | H | H | H |
| CO4 | H | H | | M | M | | M | H | H | H | H | H | H |
| CO5 | H | H | | M | M | | M | H | H | H | H | H | H |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CAP101 / 22U3CAP101 | Core Paper III: Practical in Python Programming | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

**(Bachelor of Computer Applications)**

| | |
|---|---|
| **Course Objective** | To introduce the concepts of python programming constructs. |
| **Course Category** | Skill Development /Employability/Entrepreneurship |
| **Development Needs** | Global |
| **Course Description** | To development skill set in python programming and apply the concepts to develop applications in order to meet the Local and Global needs. |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Develop simple Python programs. | Program Demonstration, Projects | Program Creativity |
| CO 2 | Understand and apply the concept of control statements. | Program Demonstration | Debugging |
| CO 3 | Apply the concept of looping constructs and functions for solving basic programs. | Laboratory Practice, | Application of Logic |
| CO 4 | Develop programs for sorting of Strings, Lists, Tuples and File handler. | Constructivist learning, Code review | Program Development |
| CO 5 | Create programs using Linear and Binary Search Techniques | Demonstration, Projects | Program Development |

**Offered by** | **Computer Applications**

**Course Content** | **Instructional Hours / Week: 4**

| Unit | List of Practical |
|---|---|
| 1 | Write a python program that displays the following information: Your name, Full Address Mobile, number, College name, Course subjects. |
| 2 | Write a python program to find the largest three integers using if-else and conditional operator. |
| 3 | Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbersin order and their sum. |
| 4 | Write a python program to find the product of two matrices. |
| 5 | Write recursive functions for GCD of two integers. |
| 6 | Write recursive functions for the factorial of positive integer. |
| 7 | Write recursive functions for Fibonacci Sequence up to given number n. |
| 8 | Write recursive functions to display prime number from 2 to n. |
| 9 | Write a python program that writes a series of random numbers to a file from1 to n and display. |
| 10 | Write a python program to sort a given sequence: String, List and Tuple. |
| 11 | Write a python program to make a simple calculator. |

| | |
|---|---|
| 12 | Write a python program for Linear Search and Binary Search. |
| 13 | Write python program in which a function (with single string parameter) is defined and calling that function prints the string parameters given to function. |
| 14 | Write python program in which a class is define, then create object of that class and call simple print function define in class. |

| | |
|---|---|
| **Total Hours** | **60** |
| **Suggested Learning Methods: Solving Case studies, Program development, Code Review and Peer Coding** | **10** |

**Tools for Assessment (50 Marks)**

| Application of Logic | e-Program Creativity | e- Program Debugging | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 8 | 10 | 10 | 6 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | H | H | | M | H | | M | H | H | H | H | M | M |
| **CO2** | H | H | | M | H | | M | H | H | H | H | M | M |
| **CO3** | H | H | | M | H | | M | H | H | H | H | H | H |
| **CO4** | H | H | | M | H | | M | H | H | H | H | H | H |
| **CO5** | H | H | | M | H | | M | H | H | H | H | H | H |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 22U3MIA101 | Allied Paper I : Mathematics for Computer Science | | |
| Semester: I | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |

| | |
|---|---|
| **Course Objective** | To enable the students to learn concepts of Statistical and Numerical Methods used in Computer applications. |
| **Course Category** | Skill Development |
| **Development Needs** | Regional |
| **Course Description** | This course covers a mix of applied linear algebra, Statistics and Numerical Analysis; it covers a central point of contact between Mathematics and Computer science. |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Know the concepts of Matrices and solve the problem using Eigen values. | Lectures / Video Lectures | Problem solving Skill |
| CO 2 | Solve Simultaneous Linear algebraic equations. | Lectures / Tutorial | Assignment |
| CO 3 | Relate various formulae in Numerical Differentiation and Integration | Lectures / Video Lectures | Seminar |
| CO 4 | Evaluate the Measures of central tendency and dispersion. | Lectures / Peer Teaching | Problem solving Skill |
| CO 5 | Analyse Correlation and Regression | Lecture / Tutorial | Quiz |

**Offered by** | **Mathematics**

**Course Content** | **Instructional Hours / Week :5**

| Unit | Description | Text Book | Chapters |
|---|---|---|---|
| I | **Matrices:** Introduction – Types of Matrices –Matrix Operations - Determination – Inverse of a matrix – Rank of a Matrix. Eigen value Problems. | 1,3 | 4 |
| | **Instructional Hours** | | **15** |
| | **Suggested Learning Methods: Problem Solving Practice** | | **02 Hrs** |
| II | **System of Simultaneous Linear Algebraic Equations:** Gauss Elimination, Gauss Jordon, Gauss Jacobi Method, Gauss Seidal method (up to 3x 3 matrices). | 2 | 4 |
| | **Instructional Hours** | | **15** |
| | **Suggested Learning Methods: Class Test** | | **02 Hrs** |
| III | **Numerical Differentiations:** Newton's forward Difference - Backward Difference – Stirling's formula. **Numerical Integration:** Trapezoidal Rule - Simpson's 1/3$^{rd}$rule& Simpson's 3/8$^{th}$ rule. | 2 | 9 |
| | **Instructional Hours** | | **15** |
| | **Suggested Learning Methods: Problem Solving Practice** | | **02 Hrs** |
| IV | **Measures of Central Tendency:** Mean Median and Mode – Empirical Relationship between mean, median and mode. **Measures of Dispersion:** Range, Quartile deviation | 3 | 7,8 |

| | | | |
|---|---|---|---|
| | and Standard deviation. | | |
| | | **Instructional Hours** | **15** |
| | | **Suggested Learning Methods : Quiz** | **02 Hrs** |
| **V** | **Correlation:**Introduction, Scatter Diagram - Karl Pearson's Correlation and Spearman's Rank Correlation.<br>**Regression:**Regression equation of variables – Linear Regression. | 3 | 10,11 |
| | | **Instructional Hours** | **15** |
| | | **Suggested Learning Methods: Problem Solving Practice** | **02 Hrs** |
| | | **Total Hours** | **75 Hrs** |

| | |
|---|---|
| **Text Books** | 1. P. Kandasamy, K.Thilgavathy, K. Gunavathy, **Engineering Mathematics**, **Volume I**, S.Chand Company, 2006.<br>2. P.Kandasamy, K.Thilagavathy and K.Gunavathy, **Numerical Methods**, S.Chand& Company LTD, Revised 2005.<br>3. S. P. Gupta, **Statistical Methods**,Sultan Chand & Sons, Fourth edition, Reprint 2017. |
| **Reference Books** | 1. E. Balagurusamy, **Numerical Methods**, Tata McGraw Hill publishing company LTD, Reprint, 2008.<br>2. P.A.Navanitham, **Business Mathematics and Statistics**, **(Part II),** Jai Publishers, Trichy – 21. |
| **Web. URLs** | 1. https://youtu.be/MG7t6SWBnwA<br>2. https://www.youtube.com/watch?v=1MiT06JFNo4 |

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Problem Solving Skills | Assignment | Seminar | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | H | H | L | M | M | M | M | H | H | H | H | H | H |
| CO2 | H | H | L | M | M | M | M | H | M | M | H | M | M |
| CO3 | H | M | L | M | M | M | M | M | M | L | H | H | M |
| CO4 | H | M | L | M | M | H | M | H | H | M | H | M | H |
| CO5 | H | M | L | M | M | H | M | H | H | M | H | H | M |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 22U3CKC203 | Core Paper IV: Java Programming | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |
| (Common to B. Sc. CS / IT / AIML / BCA) | | | |
| Course Objective | To gain knowledge about basic Java language syntax and semantics to write java programs and understand the principles of classes, methods, inheritance, polymorphism and packages. | | |
| Course Category | Skill Development /Employability/Entrepreneurship | | |
| Development Needs | Global | | |
| Course Description | To understand the Object-Oriented Paradigm for developing programs using Control statements, Arrays, Packages, Interfaces, Exceptional Handling, Multi-threading and create networking applications | | |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Remember the fundamental concepts of Object-oriented Programming. | Lecture / Demonstration | Class Participation |
| CO 2 | Develop simple Java programs with Control statements and arrays. | Demonstration, Constructivist learning | Quiz |
| CO 3 | Apply the principles of packages and interfaces. | Constructivist learning Demonstration | Seminar |
| CO 4 | Design Java application using the concepts of Exception Handling and Multithreading. | Lecture, Constructivist learning, | Seminar |
| CO 5 | Develop applications using IO Streams and AWT. | Problem-based Teaching, Constructivist learning | Assignment |

| Offered by | Computer Science |
|---|---|

| Course Content | Instructional Hours / Week: 4 |
|---|---|

| Unit | Description | Text Book | Chapters |
|---|---|---|---|
| I | **Fundamentals of Object-Oriented Programming:** Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming. **Java Evolution:** History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers. **Overview of Java:** simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine-Command Line Arguments. | 1 | 1,2,3 |
| | **Instructional Hours** | | **12** |
| | **Suggested Learning Methods: Code Debugging** | | **3** |
| II | Constants, Variables, Data Types, Operators and Expressions, **Decision Making and Branching:** if, if...else, nested if, switch,? : Operator, **Decision Making and Looping:** while, do, for – Jumps in Loops - Labelled Loops, Classes, Objects and Methods. **Arrays:** One Dimensional Array-Creating an Array- Two Dimensional Array. | 1 | 4,5,6,7 & 8 |
| | **Instructional Hours** | | **12** |
| | **Suggested Learning Methods: Code Debugging** | | **3** |
| III | **Interfaces: Multiple Interface-**Introduction-Defining Interface-Extending Interface-Implementing Interface-Accessing Interface Variables. **Packages:** Introduction-Java API Packages-Using System Packages-Naming Conventions-Creating Packages- | 1 | 10,11 & 12 |

| | | | |
|---|---|---|---|
| | Accessing a Package-Using a Package-Adding a Class to a Package-Hiding Classes-Static Import. | | |
| | | **Instructional Hours** | **12** |
| | | **Suggested Learning Methods: Simple Application Development** | 3 |
| **IV** | **Exception Handling:** Fundamentals-Hierarchy of the Exception Classes- Types of Exception –Exception Class-Uncaught Exceptions-Handling Exception-User Defined Exception. **Multithreaded Programming:** The Java Thread Model-Concept of Thread-Runnable Interface-Thread Class-Thread Creation-Thread's Life Cycle-Thread Scheduling-Synchronization and Deadlock-Inter Thread Communication-Joining Threads-Suspending, Resuming and Stopping Threads-JDBC. | **2** | 10 & 11 |
| | | **Instructional Hours** | **12** |
| | | **Suggested Learning Methods: Simple Application Development** | 3 |
| **V** | **Input/Output Classes:** Input and Output Operations-Hierarchy of Classes in java.io Package-File Class-InputStream and OutputStream Classes-FileInputStream and FileOutputStream Classes-Reader and Writer Classes-RandomAccessFile Class-Stream Tokenizer. **Applets:** Applet Basics-Applet Life Cycle-Running Applets-Methods of the Applet Class-Graphics Class-Color Class-Font Class-Limitations of Applets. Java Networking -INetaddress-User Datagram Protocol, Internet Control Protocol, UDP Programming in Java Transmission Control Protocol, Multithreading & TCP Sockets Programming in Java. | 2 | 16,18 & 19 |
| | | **Instructional Hours** | **12** |
| | | **Suggested Learning Methods: Simple Application Development** | **3** |
| | | **Total Hours** | **60** |

| | |
|---|---|
| **Text Books** | 1. E. Balagurusamy, **Programming with Java – A Primer**, Tata McGraw Hill Publication, 3rd Edition, 2007<br>2. ISRD Group, **Introduction to Object Oriented Programming Through Java**, Tata McGraw Hill Publication, Forth Reprint 2008.<br>3. Java Network Programming, 4th Edition, Orielly Publication. |
| **Reference Books** | 1. Patrick Naughton& Hebert Schildt, **The Complete Reference Java 2,** Tata McGraw Hill Publication**,** 3rdEdition, 2002<br>2. John R. Hubbard, **Programming with Java**, Tata McGraw Hill Publication, 2nd Edition, 2009. |
| **Web. URLs** | **https://www.w3schools.com/java/default.asp** |

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | H | H | | M | H | | M | H | H | H | H | M | M |
| CO2 | H | H | | M | H | | M | H | H | H | H | M | M |
| CO3 | H | H | | M | H | | M | H | H | H | H | H | H |
| CO4 | H | H | | M | H | | M | H | H | H | H | H | H |
| CO5 | H | H | | M | H | | M | H | H | H | H | H | H |

**H-High; M-Medium; L-Low**

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 21U3CKC204 / 22U3CKC204 | Core Paper V: Data Structures | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |
| (Common to B. Sc. CS / IT / BCA) | | | |
| Course Objective | To enable the students to understand about the various techniques such as Linked list, Searching and Sorting, apply them to solve complex programs. | | |
| Course Category | Skill Development /Employability/Entrepreneurship | | |
| Development Needs | Global | | |
| Course Description | To understand the concept of Arrays, Stacks and Queues, Linked list, searching and sorting and apply to solve real world problem using appropriate Data Structure. | | |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Understand the representation of Arrays, Stacks and Queues. | Smart Board / Demonstration | Group Discussion |
| CO 2 | Solve the problems using Queues and List. | Smart Board / Demonstration | Quiz |
| CO 3 | Demonstrate different types of Tree representation and Graph. | Demonstration | Seminar |
| CO 4 | Design Algorithm to perform different types of Sorting. | Video Lessons | Seminar |
| CO 5 | Illustrate Symbol, hash and File organization and apply to solve real world problem using appropriate Data Structure. | Smart Board / Demonstration | Assignment |

| Offered by | Computer Science |
|---|---|

| Course Content | Instructional Hours / Week: 4 |
|---|---|

| Unit | Description | Text Book | Chapters |
|---|---|---|---|
| I | **Introduction:** Overview - create Programs - Analyse Programs. **Arrays:** Axiomatization - Sparse Matrices - Representation of Arrays. **Stacks & Queues:** Fundamentals - Evaluation of Expressions - Multiple Stacks and Queues. | 1 | 1,2,3 |
| | | **Instructional Hours** | **12** |
| | **Suggested Learning Methods: Write Algorithms for Real time Scenario** | | **3** |
| II | **Recursion:** Recursive definition and process - recursion in C - Writing Recursive program - simulating Recursion - efficiency of recursion. **Queues and List:** The queue and its sequential representation - Linked list - List in C - An example Simulation using linked list - other list structure. | 2 | 3,4 |
| | | **Instructional Hours** | **12** |
| | **Suggested Learning Methods: Write Algorithms for Real time Scenario** | | **3** |
| III | **Trees:** Binary Tree - Binary Tree representation - the Huffman algorithm - representing list as Binary - Trees and their applications - Game trees. **Graphs:** A Flow problem - The linked representation of Graph - Graph traversal and spanning forests | 2 | 5,8 |
| | | **Instructional Hours** | **12** |
| | **Suggested Learning Methods: Group Discussion** | | **3** |

| | | | |
|---|---|---|---|
| **IV** | **Internal Sorting:** Insertion Sort - Quick Sort - 2-Way Merge Sort - Heap Sort - Shell Sort. **External Sorting:** Storage Devices - K-Way Merging. **Sorting With Tapes:** Balanced Merge Sorts - Polyphase Merge. | 1 | 7,8 |
| | | **Instructional Hours** | **12** |
| | | **Suggested Learning Methods: Group Discussion** | **3** |
| **V** | **Symbol Table:** Static Tree Tables - Dynamic Tree Tables. **Hash Tables:** Hashing Functions- Overflow Handling. **Files:** Files, Queries and Sequential Organizations- Index Techniques - **File Organization:** Sequential Organization- Random Organization- Linked Organization. | 1 | 9, 10 |
| | | **Instructional Hours** | **12** |
| | | **Suggested Learning Methods - Video Presentation** | **2** |
| | | **Total Hours** | **60** |

| | |
|---|---|
| **Text Books** | 1. Ellis Horowitz &SartajSahni, **Fundamentals of Data Structures**, Galgotia Publication.<br>2. Aaron M. Tenenbaum, YedidyahLangsam, Moshe J.Augenstein, **Data Structure using C**, Pearson Education, 2009.<br>**Unit I:** Sections: 1.1 to 1.4, 2.1 to 2.4and 3.1 to 3.4 (Text Book 1: Chapter 1, 2 and 3)<br>**Unit II:** Sections: 3.1 to 3.4, 4.1 to 4.5 (Text Book 2: Chapter 3 and 4)<br>**Unit III:** Sections: 5.1 to 5.6 (Text Book 2: Chapter 5)<br>**Unit IV:** Section: 7.1 to 7.8, 8.1 to 8.3 (Text Book 1: Chapter 7 and 8)<br>**Unit V:** Section: 9.1 to 9.3, 10.1, 10.3 (Text Book 1: Chapter 9 and 10) |
| **Reference Books** | **1.** Ellis Horowitz, Sartaj Sahni & Sanguthevar Rajasekaran, **Fundamentals of Computer Algorithms**, Galgotia Publications Pvt Ltd, 1999.<br>**2.** Jean-Paul Tremblay and Paul G.Sorenson, **An Introduction to Data Structures with Applications**, Second Edition, Tata MaGraw Hill,2008.<br>**3.** Mark Allen Weiss, **Data Structures and Algorithm Analysis in C**, Florida International University, Pearson Education, Second Edition, 1997. |
| **Web. URLs** | **https://www.programiz.com/dsa** |

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Class Participation | Assignment | Seminar | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | H | H | M | M | M | | M | H | H | H | H | M | M |
| **CO2** | H | H | M | M | M | | M | H | H | H | H | M | M |
| **CO3** | H | H | M | M | M | | M | H | H | H | H | H | H |
| **CO4** | H | H | M | M | M | | M | H | H | H | H | H | H |
| **CO5** | H | H | M | M | M | | M | H | H | H | H | H | H |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 22U3CAP202 | Core Paper VI: Practical in Java and Network Programming | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |
| (Bachelor of Computer Applications) | | | |
| Course Objective | To enable the students to develop problem solving skills and programming ability in Java language. | | |
| Course Category | Skill Development /Employability/Entrepreneurship | | |
| Development Needs | Global | | |
| Course Description | To make the students to understand the object-oriented paradigm, design technique, syntax. | | |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Develop programs to implement the string, array and multiple inheritance concepts. | Problem Based Teaching, Constructivist learning | Program Creativity |
| CO 2 | Implement the multithreading, exception handling concepts to solve real world problems | Constructivist learning, Code Review | Debugging |
| CO 3 | Apply the concept of package to illustrate reusability. | Constructivist learning | Application of Logic |
| CO 4 | Create application for file handling. | Problem Based Teaching, Constructivist learning | Program Development |
| CO 5 | Create Networking Applications using Java Network Programming concepts | Problem Based Teaching, Constructivist learning | Program Development |

| Offered by | Computer Applications |
|---|---|

| Course Content | Instructional Hours / Week: 4 |
|---|---|

| Unit | List of Practical |
|---|---|
| 1 | Write a Java Applications to extract a portion of a character string and print the extracted string. |
| 2 | Write a Java program to insert an element (specific position) into an array. |
| 3 | Write a Java Program to implement the concept of Interfaces. |
| 4 | Write Java program to implement overloading of methods. |
| 5 | Write a program to implement the concept of Exception Handling. |
| 6 | Write java program to demonstrate runtime polymorphism using overriding. |
| 7 | Write Java program to add two matrices. |
| 8 | Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them. |
| 9 | Write a Java program to import classes from user defined package and creating package. |
| 10 | Write a Java program to process text file. |
| 11 | Write a Java Program to find the IP Address of the Machine |

| | |
|---|---|
| 12 | Write a Java Program to implement TCP Protocol. |
| 13 | Write a Java Program to illustrate the Local Loop in the network. |
| 14 | Write a Java Program to implement UDP Protocol. |
| 15 | Write a Java Program to implement Stop and Wait Protocol |

| | |
|---|---|
| **Suggested Learning Methods: Solving Case studies, Peer tutoring and pair programming** | **10** |
| **Total Hours** | **60** |

**Tools for Assessment (50 Marks)**

| Application of Logic | e-Program Creativity | e- Program Debugging | Test 1 | Test 2 | Observation Note Book | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 8 | 10 | 10 | 6 | 50 |

**Mapping**

| CO / PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | M | M | - | M | M | - | - | H | M | H | H | M | M |
| **CO2** | M | H | - | M | M | - | M | H | M | H | M | H | M |
| **CO3** | M | H | - | M | M | - | - | H | H | M | M | M | H |
| **CO4** | H | H | - | M | M | - | - | H | M | H | H | H | M |
| **CO5** | H | H | - | M | M | - | - | H | H | M | H | M | H |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |

| Course Code | Title | | |
|---|---|---|---|
| 22U3MIA202 | Allied Paper II : Discrete Mathematics | | |
| Semester: II | Credits: 4 | CIA: 50 Marks | ESE: 50 Marks |
| (Common to B. Sc. CS / DS / IT / AIML / DCFS / BCA) | | | |
| Course Objective | To learn about the Discrete Structure for Computer Based Application. | | |
| Course Category | Skill Development | | |
| Development Needs | Regional | | |
| Course Description | This course is to understand and use abstract discrete structures that are backbones of Computer Science. In particular, this course meant to introduce logic, proofs, sets, relations, functions, counting, and graph with an emphasis on applications in Computer Science. | | |

| Course Outcomes | | Teaching Methods | Assessment Methods |
|---|---|---|---|
| CO 1 | Learn the basic concepts of Set theory | Lectures / Peer Teaching | Assignment |
| CO 2 | Implement the basic ideas of Mathematical Logic in Computer Science | Lectures / Tutorial | Seminar |
| CO 3 | Classify different types of Relations and Functions | Lectures / Video Lectures | Assignment |
| CO 4 | Infer the concepts of Grammar and Automata theory. | Lectures / Tutorial | Work Sheet |
| CO 5 | Know the concepts of Graph theory | Lectures / Video Lectures | Quiz |

| Offered by | Mathematics |
|---|---|

| Course Content | Instructional Hours / Week : 5 |
|---|---|

| Unit | Description | Text Book | Chapters |
|---|---|---|---|
| I | **Set Theory:** Introduction-Set & its Elements-Set Description-Types of sets-Venn-Euler Diagrams-Set operations & Laws of set theory.<br>Fundamental products- Partitions of sets – Minsets- Algebra of sets and Duality-Inclusion and Exclusion Principle | 1 | 1 |
| | **Instructional Hours** | | 15 |
| | **Suggested Learning Methods: Problem Solving Practice** | | 02 Hrs |
| II | **Mathematical Logic:** Introduction- prepositional calculus –Basic logical operations- Tautologies-Contradiction – Argument-PDNF & PCNF - Method of proof. | 1 | 12 |
| | **Instructional Hours** | | 15 |
| | **Suggested Learning Methods: Class Test** | | 02 Hrs |
| III | **Relations:** Binary Relations – Set operation on relations-Types of Relations – Partial order relation – Equivalence relation – Composition of relations.<br>Functions – Types of functions – Invertible functions – Composition of functions. | 1 | 3,4 |
| | **Instructional Hours** | | 15 |

| | | | |
|---|---|---|---|
| | **Suggested Learning Methods: Assignments** | | **02 Hrs** |
| **IV** | **Languages:** Operations on languages – Regular Expressions and regular languages.<br>**Grammar:** Types of grammars – Grammar Construction-Finite state machine –Finite State Automata- DFA- NDFA- Conversion of NDFA into DFA. | 1 | 15 |
| | | **Instructional Hours** | **15** |
| | **Suggested Learning Methods: Problem Solving Practice** | | **02 Hrs** |
| **V** | **Graph Theory:** Basic terminology – paths, cycle & Connectivity – Sub graphs – Types of graphs.<br>Trees – Properties of trees – Binary trees-Traversal of Binary Trees. | 1 | 9,10 |
| | | **Instructional Hours** | **15** |
| | **Suggested Learning Methods: Problem Solving Practice** | | **02 Hrs** |
| | | **Total Hours** | **75 Hrs** |

| | |
|---|---|
| **Text Books** | 1. J.K. Sharma, **Discrete Mathematics**, Macmillan India Ltd, 2nd edition, 2005. |
| **Reference Books** | 1. J. P. Tremblay, R. Manohar, **Discrete Mathematics Structures with Applications to Computer Science**, McGraw Hill International Edition, 2005.<br>2. T.Veerarajan, **Discrete Mathematics with Graph Theory and Combinatories**, McGraw Hill International Edition, 2008 |
| **Web. URLs** | **1. https://www.youtube.com/watch?v=oaOm2pnKkyY**<br>2. **https://youtu.be/tyDKR4FG3Yw** |

**Tools for Assessment (50 Marks)**

| CIA I | CIA II | CIA III | Assignment | Seminar | Quiz | Total |
|---|---|---|---|---|---|---|
| 8 | 8 | 10 | 8 | 8 | 8 | 50 |

**Mapping**

| CO \ PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PSO1 | PSO2 | PSO3 | PSO 4 | PSO 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | |

H-High; M-Medium; L-Low

| Course designed by | Verified by |
|---|---|
| | |
| | |